BOARD OF MANAGERS:
Mike Myser, President; Curt Hennes, Vice President; Bruce Loney, Treasurer;
Steve Pany, Secretary and Frank Boyles, Manager

Note: Indicated times are estimates; actual times may vary considerably. Individuals with items on the agenda or who wish to speak to the Board are encouraged to be in attendance when the meeting is called to order.

Board Workshop 4:00 PM – Council Chambers (Please note change)

- 2021 Draft Budget
- Upper Watershed Blueprint Update
- District Bank Relationship
- Updates: FEMA, Sutton Lake Project and Financial Services

6:00 – 6:10 PM 1.0 BOARD MEETING CALL TO ORDER & PLEDGE OF ALLEGIANCE

6:10 – 6:15 PM 2.0 PUBLIC COMMENT

If anyone wishes to address the Board of Managers on an item not on the agenda or on the consent agenda please come forward at this time, turn on the microphone and state your name and address. (The Chair may limit your time for commenting.)

6:15 – 6:20 PM 3.0 APPROVAL OF AGENDA (Additions/Corrections/Deletions)

PUBLIC HEARING 2020 PRELIMINARY LEVY
- 2021 Levy—Resolution 20-343 (Vote)

6:20-7:15 PM 4.0 OTHER OLD/NEW BUSINESS

4.1 Programs & Projects Update (Discussion Only)
  - Water Quality, Water Storage and AIS Inspections
4.2 IPM Plan Update (Maggie Karschnia and Tony Havranek, WSB) (Discussion Only)
4.3 Pickleball Court Permit 20-01 (Maggie Karschnia and Carl Almer) (Vote)
4.4 Pike Lake Culvert Permit 20-02 (Pete Young) (Vote)
4.5 New CAC Member Application-Ben Burnett (Kathryn Keller-Miller) (Vote)

7:15-7:30 PM 5.0 CONSENT AGENDA

The consent agenda is considered as one item of business. It consists of routine administrative items or items not requiring discussion. Items can be removed from the consent agenda at the request of the Board member, staff member, or a member of the audience. Please state which item or items you wish to remove for separate discussion.

5.1 Meeting Minutes – August 13 Workshop and Board Meeting
5.2 Meeting Minutes—August 27 CAC Meeting
5.3 Claims List
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:30-7:45 PM</td>
<td>6.0 TREASURER’S REPORT</td>
</tr>
<tr>
<td></td>
<td>6.1 Cash &amp; Investments (Discussion Only)</td>
</tr>
<tr>
<td></td>
<td>6.2 Financial Report (Discussion Only)</td>
</tr>
<tr>
<td>7:45-7:50 PM</td>
<td>7.0 Manager Presentations on Watershed-related Items (Discussion Only)</td>
</tr>
<tr>
<td>7:50-7:55 PM</td>
<td>8.0 UPCOMING MEETING/EVENT SCHEDULE:</td>
</tr>
<tr>
<td></td>
<td>• CAC MEETING, CITY HALL, THURSDAY, SEPTEMBER 24, 2020</td>
</tr>
</tbody>
</table>
Resolution 20-343
Certifying the 2021
Administrative and Metropolitan Water Management Tax Levy

WHEREAS the Prior Lake-Spring Lake Watershed District (PLSLWD) is a watershed management organization and political subdivision of the State of Minnesota established under and operating with powers and purposes set forth at Minnesota Statutes Chapters 103B and 103D;

WHEREAS the PLSLWD has an approved watershed management plan under Minnesota Statutes Section 103B.231;

WHEREAS Minnesota Statute Section 103D.905, subdivision 3, authorizes the PLSLWD to levy an *ad valorem* tax on real property within the PLSLWD for the administrative expenses of the District not to exceed $250,000.00;

WHEREAS Minnesota Statutes Section 103B.241, subdivision 1, authorizes the PLSLWD to levy an *ad valorem* tax on real property within the PLSLWD sufficient to pay the increased costs to the PLSLWD to prepare and implement its watershed management plan;

THEREFORE, BE IT RESOLVED that in accordance with Minnesota Statutes Section 103D.915, the Board hereby approves and certifies to the Scott County Auditor an *ad valorem* levy in the total amount of $1,794,632 to be levied on all taxable property within the PLSLWD, composed of the following:

- **$166,126** for the General Fund under authority of Minnesota Statutes Section 103D.905, subdivision 3;
- **$1,628,506** to implement the watershed management plan under Minnesota Statutes Section 103B.241, for general projects and programs of the PLSLWD.

The question was on the adoption of the Resolution and there were __ yeas and __ nays as follows:

<table>
<thead>
<tr>
<th></th>
<th>Yea</th>
<th>Nay</th>
<th>Absent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BOYLES</td>
<td>HENNES</td>
<td>LONEY</td>
</tr>
<tr>
<td></td>
<td>MYSER</td>
<td>PANY</td>
<td></td>
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</table>

Upon vote, the chair declared the resolution adopted.

__________________________  Dated: ________________, 2020

Steve Pany, Secretary
## September 2020 Programs and Projects Update

<table>
<thead>
<tr>
<th>Program or Project</th>
<th>Last Month’s Staff Activities</th>
<th>Next Steps</th>
</tr>
</thead>
</table>
| **Storage & Infiltration Projects** (Sutton Lake) Project Lead: Diane | • District Attorney is working with MMB on easement language  
• Provide drafts of easements to property owners | • Once the MMB approves of the easements, secure signatures on easements |

| **Carp Management**  
Rough Fish Management (Class 611)  
Carp Management Project (Class 750 & 751) Project Lead: Maggie | • **Tracking**: Continued to track radio-tagged and PIT-tagged carp across Spring and Prior Lakes and connecting waterbodies.  
• **Baited Box Traps**: Three box traps have been deployed: two are currently on Spring Lake, one by the Spring Lake Parcel and one by Spring Lake Regional Park; and one is on Upper Prior Lake to the southwest of the boat launch. Volunteers and staff have been checking on the sites and re-filling the bait bags as needed. On 7/30 and 8/12 when a large group of carp were regularly visiting the site, the trap was sprung and the carp were removed and taken to the Hentges farm for compost. To date, there have been 626 carp removed using the baited box traps totaling roughly 3,000 pounds.  
• **Carp Volunteer Projects**: The PLSLWD has solicited volunteer help with carp tracking, baiting, and training.  
• **Geis Wetland Removals**: Carp were removed through electrofishing efforts on 8/19. Stocked bluegills were observed from last spring.  
• **FeCl Weir Barrier**: The installation of the new carp barrier and walkway is complete.  
• **MPCA 319 Project Tour**: Mark Hanson, the MPCA 319 grant administrator, toured the site with staff on September 1st.  
• **IPM Plan Update**: Staff worked with WSB to update the IPM Plan. | • WSB and PLSLWD staff will continue to track the tagged carp.  
• Ensure vegetation establishment at the FeCl weir project site.  
• Work with WSB to schedule and coordinate upcoming carp removals as opportunities arise for both electrofishing and micro-haul events.  
• Continue to monitor, update, and remove carp from the baited box traps.  
• Coordinate citizen-assisted volunteer projects, including Training the Carp program.  
• Present the draft 2020 IPM Plan update at the September Board Meeting. |
<table>
<thead>
<tr>
<th>PROGRAM OR PROJECT</th>
<th>LAST MONTH'S STAFF ACTIVITIES</th>
<th>NEXT STEPS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Public Infrastructure Partnership Projects</strong></td>
<td>• Drafted 2021 budget</td>
<td>• Board review</td>
</tr>
<tr>
<td><em>Project Lead: Maggie &amp; Diane</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ferric Chloride System Operations</strong></td>
<td>• Installed permanent carp barrier structure and walkway</td>
<td>• Approve new NDPES permit</td>
</tr>
<tr>
<td><em>Project Lead: Jaime</em></td>
<td>• Monthly Discharge Monitoring Report</td>
<td>• Monthly Discharge Monitoring Report</td>
</tr>
<tr>
<td></td>
<td>• Samples taken weekly and inspected facility an additional 2x/week</td>
<td>• Sample weekly and inspect facility 2x/week</td>
</tr>
<tr>
<td><strong>Farmer-Led Council</strong></td>
<td>• Cover crop sign-ups are complete and seeding is getting scheduled.</td>
<td>• Potential cover crop tour this fall.</td>
</tr>
<tr>
<td><em>Project Lead: Maggie</em></td>
<td></td>
<td>• Explore farmer mentorship program with FLC.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Outreach to researchers and investigate possible grants for a 2021 farming research project.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Next FLC meeting in December.</td>
</tr>
<tr>
<td><strong>Cost Share Incentives</strong></td>
<td>• Respond to cost-share requests and questions as received.</td>
<td>• Respond to cost-share requests and questions as received.</td>
</tr>
<tr>
<td><em>Project Lead: Kathryn, Diane</em></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Spring Lake Parcel Restoration Project</strong></td>
<td>• AES will be performing vegetation maintenance on the parcel, removing buckthorn re-sprouts and treating other invasive vegetation.</td>
<td>• Monitor restoration and control invasive species during growing season.</td>
</tr>
<tr>
<td><em>Project Lead: Maggie &amp; Kathryn</em></td>
<td></td>
<td>• Install small plant identification signs</td>
</tr>
<tr>
<td><strong>Raymond Park Restoration Project</strong></td>
<td>• Developing interpretative signs for project.</td>
<td>• Install educational interpretative signs</td>
</tr>
<tr>
<td><em>Project Lead: Kathryn</em></td>
<td></td>
<td>• Host ribbon-cutting event later this year to highlight restoration</td>
</tr>
<tr>
<td><strong>Fish Lake Shoreline &amp; Prairie Restoration Project</strong></td>
<td>• MN Native Landscapes (MNL) performing vegetation maintenance.</td>
<td>• MN Native Landscapes is conducting restoration maintenance/establishment work</td>
</tr>
<tr>
<td><em>Project Lead: Kathryn</em></td>
<td>• Project is one of the sites highlighted by the Hike the Watershed Challenge.</td>
<td></td>
</tr>
<tr>
<td><strong>CR 12/17 Wetland Restoration</strong></td>
<td>• No new activity.</td>
<td>• Meet with the County &amp; City on-site for another effort to trouble-shoot outlet structure issues.</td>
</tr>
<tr>
<td><em>Project Lead: Maggie</em></td>
<td></td>
<td>• Officially hand over vegetation maintenance of project to City of Prior Lake.</td>
</tr>
</tbody>
</table>

**September 2020 Programs and Projects Update**
<table>
<thead>
<tr>
<th>PROGRAM OR PROJECT</th>
<th>LAST MONTH’S STAFF ACTIVITIES</th>
<th>NEXT STEPS</th>
</tr>
</thead>
</table>
| **Lower Prior Lake Retrofit Projects**  | • No new activity.                                                                           | • Continue to work with MNL on site maintenance until the projects are fully established and accepted by the City of Prior Lake  
• Install interpretive signs for projects |
| Project Lead: Maggie       |                                                                                               |                                                                                                                                                                                                           |
| **District Plan Update**    | • Reviewed prototype Plan                                                                     | • Print copies and distribute, as needed                                                                                                                                                                 |
| Project Lead: Diane        |                                                                                               |                                                                                                                                                                                                           |
| **Feasibility Reports**     | • No new activity.                                                                            | • Conduct in-person meeting with farmer and landowner for the Spring Lake West subwatershed project when COVID-19 restrictions are lifted.  
• Coordinate remote meeting with MnDOT and City of Savage to discuss options for Lower Prior Lake subwatershed project. |
| Project Lead: Maggie       |                                                                                               |                                                                                                                                                                                                           |
| **Website and Media**       | • Website articles posted: New carp barrier installed at ferric site; Hike the Watershed featured by local newspapers.  
• Prior Lake Am: Hike the Watershed article published  
• SCENE: Submitted articles on Hike the Watershed for Oct/Nov edition  
• Facebook & Twitter- normal posting, carp, Hike the Watershed, native plant garden photos posts received attention. | • Continue writing posts and updates about projects  
• Will tweet and/or update Facebook about projects & news  
• Write article for next SCENE edition   |
| Project Lead: Kathryn      |                                                                                               |                                                                                                                                                                                                           |
| **Citizen Advisory Committee** | • August meeting held in person at City Hall with social distancing & masks  
• Subcommittees researching topics – research continuing on interactive AIS signage used at some boat launches.  
• Coordinate subcommittee work | • Subcommittees continue research, present findings to Board.                                                                                                                                              |
| Project Lead: Diane & Kathryn |                                                                                               |                                                                                                                                                                                                           |
| **MS4 Education Program**  | • Planning events and activities for District anniversary. Hike the Watershed challenge is ongoing and highlights District projects and area lakes & encourages people to get out and explore the District. | • Implement education activities  
• Plan anniversary events and activities |
| Project Lead: Kathryn      |                                                                                               |                                                                                                                                                                                                           |
| **Monitoring Program**      | • Supervise AIS boat inspections  
• Monitor stream and lake chemistry  
• Took flow measurements  
• Download level loggers | • Sample streams biweekly  
• Take flow measurements  
• Data entry                                                                                                                                  |
| Project Lead: Jaime        |                                                                                               |                                                                                                                                                                                                           |
### SEPTEMBER 2020 PROGRAMS AND PROJECTS UPDATE

<table>
<thead>
<tr>
<th>PROGRAM OR PROJECT</th>
<th>LAST MONTH'S STAFF ACTIVITIES</th>
<th>NEXT STEPS</th>
</tr>
</thead>
</table>
| **Aquatic Vegetation Management and Surveys**  
(Class 626 and 637)  
Project Lead: Jaime | • Mapped vegetation on Upper Prior, Jeffers, Fish, Spring, Lower Prior, Crystal  
• Received payment from Scott County for CLP treatment | • Finish summer plant surveys                                          |
| **BMPs & Easements**  
Project Lead: Maggie & Kathryn | • Continued to work with landowners to resolve existing violation issues on their properties. Met with several landowners.  
• Easement inspections completed.  
• Responded to landowner questions and met with several landowners.  
• Completed several baseline documents. | • Review amendment requests as they are received and work with landowners towards closing out approved amendment requests  
• Work with landowners to resolve easement violations  
• Complete baseline documentation for each conservation easement property  
• Send post-inspection letters for completed inspections |
| **Permitting**  
Project Lead: Maggie & Jeff | • Completed inspections on permit sites and followed up with permittees.  
• Met with MnDOT onsite and discussed outstanding ESC issues at the #18.05 permit at the Highway 13 project site.  
• EOR provided review on upcoming development projects, including Parkhaven development.  
• Solicited and received four request to close out old permits.  
• Received and reviewed three permit requests. | • Present permit projects for review at the September Board Meeting.  
• Continue to inspect, follow-up on and close remaining open permits. |
| **Rules Revisions**  
Project Lead: Diane | • No activity | • Invite a subgroup from the TAC to review rule revisions  
• Present the revisions at an upcoming Board meeting for final approval |
| **Outlet Channel O&M**  
Project Lead: Jaime | • Few channel inspections now that lake is not outletting  
• Management of woody and herbaceous vegetation along the channel  
• Rock dams in channel removed | • Weekly channel inspections  
• Continue invasive plant management in channel  
• Install cameras at structure |
| **Outlet Channel Bank Erosion (FEMA)**  
Project Lead: Diane | • Revised Closeout on Trees and Sediment Delta sent to FEMA by HSEM | • Bank Erosion project closeout  
• Monitor warranty work of contractor |
| **Outlet Channel Admin**  
Project Lead: Diane & Jaime | • Finalize budget and work plan for 2021 | • Cooperators meeting in Sept to finalize budget and work plan |
PLSLWD staff is requesting one of the following three actions:

1. The Board make a motion to approve the 2020 IPM Plan for Common Carp as written.
2. The Board make a motion to approve the 2020 IPM Plan for Common Carp with minor revisions as identified.
3. The Board direct staff to make substantial changes to the plan which will be updated and brought to the Board for approval at its October meeting.

BACKGROUND

With the understanding that common carp play a role in the decline of water quality within the Prior Lake Spring Lake Watershed, the Board first approved the District’s Integrated Pest Management (IPM) Plan for Common Carp on May 9, 2017 which was subsequently updated on May 8, 2018. The IPM Plan supports the District’s water quality goals established for individual waterbodies throughout the watershed, as well as the goals of the 2011 Upper Prior and Spring lake TMDL.

The IPM Plan is intended to be a living document, using adaptive management that may develop new management strategies and plan goals through data collection and analysis. As new information and techniques are acquired, current approaches, data collection efforts, and prioritization may change. The IPM plan should be reviewed annually to provide updates to identified goals and action items and potentially add or modify goals as data collection may dictates.

DISCUSSION

The IPM Plan for Common Carp has been developed as a guidance document for the management of common carp populations within the Prior Lake Spring Lake Watershed. With the 2020 annual update to the IPM Plan, District staff received initial comments and feedback from the Board of Managers on proposed carp management methods and cost-effectiveness of the overall program over time at its June meeting. The success and cost-effectiveness of the individual removal methods were discussed at the August meeting and PLSLWD staff received feedback from Board Managers on what components they would like to see included in the 2020 IPM Plan update. Those comments have been incorporated to the attached latest draft for Board review.
RECOMMENDATION

Staff Recommendation:
District staff recommends that if the Board is satisfied with the IPM Plan that it make a motion to approve it as long as it meets the following needs:

- Provides sufficient information on the status of carp in the watershed.
- Identifies all preferred tools available for carp management.
- Is a useful tool to Board and staff for making carp management decisions.

Action Required:
PLSLWD staff is requesting one of the following three actions from the Board of Managers:

1) The Board make a motion to approve the 2020 IPM Plan for Common Carp as written.
2) The Board make a motion to approve the 2020 IPM Plan for Common Carp with minor revisions as identified.
3) The Board direct staff to make substantial changes to the plan which will be updated and brought to the Board for approval at its October meeting.
2020
Integrated Pest Management Plan
(IPM Plan)
FOR COMMON CARP

PREPARED BY:
Tony Havranek, Senior Environmental Scientist, WS8
Mary Newman, Environmental Scientist, WS8
Maggie Karschnia, Project Manager, PLSLWD
Integrated Pest Management Plan (IPM)
For Common Carp

Updated and approved by the PLSLWD Board of Managers on:

_______, 2020
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B. ACCELERATED STRATEGIES

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PART 7 - SUMMARY

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APPENDIX A – 2018 CLEAN WATER PARTNERSHIP GRANT FINAL REPORT
APPENDIX B – ARCTIC LAKE FISHERIES ASSESSMENT 2017
APPENDIX C – CARP MANAGEMENT COST-BENEFIT SUMMARY 2020
APPENDIX D – CARP REMOVAL DATA 2016 – 2020
APPENDIX E – PIKE LAKE FISHERY ASSESSMENT 2020
PART 1 - EXECUTIVE SUMMARY

1.1 BACKGROUND

Common carp (Cyprinus carpio), a non-native fish originating in the Caspian region of Eurasia, are the most widely distributed nuisance fish in the United States (Nico et al., 2012). Carp can have direct and indirect negative effects on water quality by uprooting submergent and emergent aquatic vegetation and by releasing phosphorous sequestered in lake sediments. The phosphorus is then available to free floating algae and can lead to an increase in total phosphorous and Chlorophyll-a concentrations in the lake and to a decrease in water clarity. By removing the carp from the system, both the phosphorus within the carp carcass and the amount that would typically be excreted will be completely removed, while also abating the release of phosphorus created by foraging behavior.

1.2 PRIORITY CARP MANAGEMENT LAKES

Spring Lake, Upper Prior Lake, and Pike Lake are listed on the MPCA’s impaired waters list due to excess nutrients, and the TMDLs identify internal loading from rough, benthic fish, such as common carp, as one of its main contributors. These impairments limit recreational opportunities as well as waterfowl habitat, native aquatic vegetation abundance, and native game fish populations. As most of the waterbodies within the PLSLWD are connected, improvements to the impaired waters will also have benefits downstream.

As they are listed as Tier 1 Lakes in the PLSLWD’s 2020-2030 Water Resources Management Plan, receive the highest public use, and are currently on the state’s impaired waters list, the District has established the following two lakes as its top carp management priority:

<table>
<thead>
<tr>
<th>Table 1. Summary of Top Carp Management Priority Lakes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Carp Biomass Estimate (kg/ha)</strong></td>
</tr>
<tr>
<td>Upper Prior Lake</td>
</tr>
<tr>
<td>Spring Lake</td>
</tr>
</tbody>
</table>

Note that while Upper Prior and Spring Lakes are top priority lakes, the PLSLWD is tracking the other six connected chain-of-lakes as they are part of the whole system that the common carp population uses. Understanding the dynamics of the entire watershed system is the key component to successful long-term management of carp.

Secondary Priority Lakes. The PLSLWD also partners with SMSC in tracking carp on Arctic and Pike Lakes. SMSC is the lead partner on these two waterbodies and has completed removals on Arctic Lake with plans to remove carp on Pike Lake by the end of 2021. PLSLWD is assisting and complementing SMSC efforts with its carp program and plays only a supportive role at this time.
1.3 INTEGRATED PEST MANAGEMENT APPROACH

This plan uses integrated pest management (IPM) principles to effectively manage the common carp populations. IPM involves the use of targeted carp removals and barriers, as well as monitoring environmental parameters that can inhibit or promote carp population growth within the waterbodies. Adaptive management will use data that is collected on the carp population including population and biomass estimates as well as migration routes and winter aggregation locations.

This IPM plan is intended to be a living document; using adaptive management may include developing new management strategies and plan goals through data collection and analysis. As new data is collected and analyzed, current approaches, data collection efforts, and prioritization may change. This IPM aims to mitigate the effect that common carp are having on the load of excess nutrients to these lakes, and protect those that are currently meeting water quality standards.

1.4 REMOVAL METHOD SELECTION

By far, the single most expensive component to the IPM Plan is the REDUCE strategies (carp removals). With careful analysis and selection, the PLSLWD can select the best tool for the situation presented.
COST-EFFECTIVE COMPARISON OF METHODS

From January to June 2020, the removal methods were assessed for cost-effectiveness. Those results were pooled together in order to look at each method as a whole. The following table summarizes that assessment comparison with removal methods listed from most to least cost-effective:

Table 2. Cost-Effectiveness Comparison of Carp Removal Methods:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Seine:</td>
<td>13,528</td>
<td>45%</td>
<td>$48,840</td>
<td>$0.81</td>
</tr>
<tr>
<td>Micro-haul:</td>
<td>565</td>
<td>2%</td>
<td>$2,142</td>
<td>$1.52</td>
</tr>
<tr>
<td>Specialized Trap Net:</td>
<td>2,008</td>
<td>7%</td>
<td>$27,716</td>
<td>$13.80</td>
</tr>
<tr>
<td>Electrofishing:</td>
<td>8,358</td>
<td>28%</td>
<td>$20,000</td>
<td>$2.39</td>
</tr>
<tr>
<td>Baited Box Trap:</td>
<td>2,989</td>
<td>10%</td>
<td>$18,754</td>
<td>$6.27</td>
</tr>
<tr>
<td>Gill Netting:</td>
<td>2,293</td>
<td>8%</td>
<td>$15,000</td>
<td>$6.54</td>
</tr>
</tbody>
</table>

Note that in some instances, costs are much lower in 2021 as all of the materials to deploy the method were incurred in 2020.

REMOVAL METHOD CONSIDERATIONS

PLSLWD will consider the following when deciding which removal methods to employ:

1) **Feasibility**: How likely will this method result in success? What are the obstacles?
2) **Time-Oriented**: Is immediate removal necessary to meet goal deadlines? Will the timeliness affect success of other projects (e.g. alum treatment)?
3) **Cost-Effective**: Is this method worth the cost based on anticipated results?
4) **Effort for Results**: Is this the best method for the amount of effort required? Given limitations of staff, what methods produce the greatest results for the least amount of effort?

The consideration questions and table above will provide staff with a decision-making tool. Given limited resources, staff will assess which method is most feasible, time-oriented, cost-effective, and requires the least amount of effort for the greatest result.

1.5 2020-2021 STRATEGIES & TIMELINE

The PLSLWD set an ambitious goal in 2019 to reach carp management levels of **30 kg/ha on both Spring & Prior Lakes** in 2020. While the PLSLWD made great strides in incorporating new, innovative removal techniques in the first half of 2020, it is still far from its goal.

The table below illustrates the amount of effort that it would take on each lake to reduce carp down to 30 kg/ha goal levels, given the different removal methods available and their anticipated maximum output. While the success and feasibility of the methods listed in these scenarios can be widely variable, this is meant to provide an example for planning purposes. All of the removal methods will be employed in 2020 & 2021.
**Upper Prior Lake:** 76,939 pounds reduction needed  
**Spring Lake:** 112,238 pounds reduction needed

**Table 3. EXAMPLE Illustration of Effort Required to Reach 30 kg/ha**

<table>
<thead>
<tr>
<th>Removal Method</th>
<th>UPPER PRIOR LAKE Estimated Pounds</th>
<th>SPRING LAKE Estimated Pounds</th>
<th>Timeline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Water Seine</td>
<td>20,000</td>
<td>20,000</td>
<td>Fall 2020</td>
</tr>
<tr>
<td>Gill Netting</td>
<td>2,000</td>
<td>2,000</td>
<td>Fall 2020</td>
</tr>
<tr>
<td>Electrofishing</td>
<td>2,000</td>
<td>2,000</td>
<td>Fall 2020</td>
</tr>
<tr>
<td>Under Ice Seine</td>
<td>35,000</td>
<td>35,000</td>
<td>Winter 2021</td>
</tr>
<tr>
<td>Under Ice Seine</td>
<td>0</td>
<td>35,000</td>
<td>Winter/2021</td>
</tr>
<tr>
<td>Spring Electrofishing</td>
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<td>Spring 2021</td>
</tr>
<tr>
<td>Push Trap</td>
<td>2,000</td>
<td>2,000</td>
<td>Spring 2021</td>
</tr>
<tr>
<td>Gill Netting</td>
<td>5,000</td>
<td>5,000</td>
<td>Spring 2021</td>
</tr>
<tr>
<td>Baited Box Traps</td>
<td>1,000</td>
<td>3,000</td>
<td>Summer 2021</td>
</tr>
<tr>
<td>Gill Netting</td>
<td>2,000</td>
<td>2,000</td>
<td>Fall 2021</td>
</tr>
<tr>
<td>Electrofishing</td>
<td>2,000</td>
<td>2,000</td>
<td>Fall 2021</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>76,000</strong></td>
<td><strong>112,000</strong></td>
<td></td>
</tr>
</tbody>
</table>

Note that successful commercial seines are a large component to removal success on each lake. In 2021, PLSLWD will focus heavily on seine removals as its primary tool, supplementing with other tools to reach its goals. These other methods will be especially useful when populations are low enough not to be feasible to seine but high enough that more carp still need to be removed from the system.

Key supporting strategies will be employed to increase probability of removal success:

- **Tracking Carp:** Continuing to identify migration routes and aggregations for better removals
- **Blocking Carp:** Ensuring that carp barrier are working effectively; identifying additional spawning areas to block to ensure long-term population control after removals
- **Herding Carp:** Using underwater speakers to move carp into suitable seining areas
- **Removing Obstructions:** Diligently clearing known seine areas of any obstructions in October/early November prior to seine season. Checking seine areas with underwater drone so that obstructions can be cleared or avoided prior to removal events.
PART 2 - BACKGROUND

2.1 WATERSHED OVERVIEW

Located within Scott County, the PLSLWD lies in the Minnesota River Basin in the southwestern portion of the Twin Cities metropolitan area, and covers roughly 42 square miles of land area with over 2,500 acres of open water (Figure 1). Spring Lake, Upper Prior Lake and Lower Prior Lakes are the largest waterbodies within the PLSLWD and provide boating, fishing and other recreational opportunities. Spring Lake is connected by a natural channel to Upper Prior Lake which discharges to Lower Prior Lake which then outlets through a channel to the Minnesota River. All three lakes receive intense recreational pressure year-round and are important recreational resources to the Twin Cities metro area.

The protection and restoration of Spring and Prior Lakes are high priorities for the PLSLWD and are considered Priority Lakes by the Metropolitan Council for their high regional recreation value. A DNR public boat landing is located on each of the lakes, in addition to winter access points. Sand Point, a swimming beach on the north shore of Lower Prior Lake, boasts as much as 48,000 visitors each year. Open water activities on the lakes include fishing, boating, paddling, water skiing, jet skiing, sailing, wake boarding, and swimming. During the winter when the lake is ice-covered, recreational activities include snowmobiling, ice fishing, skating, and cross-country skiing.

Since 1970, the PLSLWD has strived to conserve, protect, and manage the water resources within the PLSLWD and have implemented a variety of projects aimed to improve water quality.

The aerial map in Figure 2 shows some of the land uses and highlights the waterbodies and wetland areas that carp may be present and/or use as spawning areas. Figure 3 shows the topography throughout the watershed and some of the hydrological connections that carp might use to travel between waterbodies.
Figure 3. Watershed Overview Map
Figure 4. Topographic Map
2.2 COMMON CARP SPECIES

Common carp (Cyprinus carpio), a non-native fish originating in the Caspian region of Eurasia, are the most widely distributed nuisance fish in the United States (Nico et al., 2012). Carp were intentionally introduced into Minnesota in the 1880s as a game fish and as a food staple for the increasing number of immigrants. By the turn of the century, the previously prized carp was considered a nuisance species for its rapid reproduction and detriment to water quality in the Minnesota’s lakes.

A. Life Cycle

Given ideal conditions, carp can be highly prolific. Carp eggs hatch usually within a week and it only takes about 15–30 days before feeding larvae grow into advanced fry. The next life stage, when the fish grows up to become a fingerling, lasts only about 45–85 days. By the end of their first summer, carp are known to get up to as much as 10 inches long, weighing 1–2 pounds. They mature as early as two years old, when the carp is roughly 12-15 inches long. A single female carp can produce over a million sticky eggs which get laid onto vegetation and rocks. While most eggs and larvae die before they reach adulthood, this can result in several hundreds of successful offspring in a single season where there are no bluegills predators present and conditions are right. Floods seem to provide especially favourable conditions for carp breeding.

A. Diet

Carp are omnivores and they consume a variety of small foods including molluscs, crustaceans, insect larvae and seeds. These food items are sucked up with the mud from the bottom of the lake or wetland and filtered out using their gill rakers, spitting out the mud and remaining debris into the water column. Carp can also consume plant material and other organic matter, especially when other food sources are not available. Carp rarely eat fish, but may consume fish eggs and larvae and disturb breeding sites for other fish species.

B. Habitat & Behavior

Like largemouth bass, carp can inhabit a wide range of habitats, but they prefer lakes and slow moving rivers, especially those with turbid water. Carp also can be found in areas where there is abundant aquatic vegetation. They are capable of tolerating a range of environmental conditions. Carp have a greater tolerance of low oxygen levels, pollutants and turbidity than most native fish, and are often associated with degraded habitats, including stagnant waters.

The bottom-feeding habits of carp often create murky lake conditions, and muddy up the water. These conditions are often unsuitable for native fish, and carp drive out their competition for lake resources.

Carp travel in schools, usually of five or more. Carp migrate to and from breeding grounds in large groups during the spawning season, sometimes travelling several miles upstream. This behavior of traveling to shallow, upstream spawning areas allows them to reach wetlands have winterkilled either frozen over or had dry, low oxygen conditions in the previous season that winterkilled any sunfish that would have predated on the carp eggs and larvae.
B. **Effects**

Carp can have direct and indirect negative effects on water quality by uprooting submersgent and emergent aquatic vegetation and by releasing phosphorous sequestered in lake sediments. The phosphorus is then available to free floating algae and can lead to an increase in total phosphorous and Chlorophyll-a concentrations in the lake and to a decrease in water clarity. By removing the carp from the system, both the phosphorus within the carp carcass and the amount that would typically be excreted will be completely removed, while also abating the release of phosphorus created by foraging behavior.

2.3 **CARP MANAGEMENT FUNDING SOURCES**

The District has been fortunate enough to receive multiple sources of grant funding since 2015 to support its carp management efforts. The following is a summary of the funding received:
PART 3 - CARP MANAGEMENT WATERBODIES

3.1 CARP MANAGEMENT LAKES

While there are 14 lakes within the PLSLWD, this IPM Plan is focused only on those eight connected waterbodies that are known carp migration routes and/or are suspected to contain common carp as shown in Figure 4 below (Fish, Buck, Spring, Arctic, Upper Prior, Lower Prior, Jeffers Pond & Pike Lakes). An overview of each carp management lake is listed below.

Figure 5. Carp Management Lakes
3.2 **FISH LAKE**

Fish Lake is a relatively small lake found in the upper watershed. Fish Lake is approximately 173 acres, has an average depth of 14 feet, and a maximum depth of 28 feet. Roughly 74 acres or 43% of the lake is considered littoral. Fish Lake is a seepage lake-outflow, meaning that there is no direct inflow to Fish Lake; rather, the hydrologic contribution is from watershed runoff and groundwater which then flows out of Fish Lake to the north towards Buck Lake.

![Fish Lake Map](image)

**Figure 6.** Fish Lake Map

**INTERNAL LOADING**

Fish Lake appears to be heavily impacted by internal loading. The 2006 Fish Lake Sustainable Lake Management Plan identifies an internal load ranging from 111 to 488 kg/yr (244 to 1,075 pounds/yr). The methodology used to derive this estimate is derived from a Canfield-Bachmann model. These models identify internal loading from anoxic release, hypolimnetic mass balance, and fall turnover; no analysis was done to determine the contribution from curly-leaf pondweed (CLP) senescence or from the foraging behavior of rough fish.

**FISHERIES ASSESSMENT**

A potential source of internal loading is from rough fish bioturbation. MN DNR fishery survey data from 2014 shows that carp and bullhead are present in Fish Lake. LaMarra (1975) identified an internal loading rate of 1.07 mp P/m²/day based on a carp density of 200 kg/ha. A very preliminary fish survey was conducted in fall of 2019 on Fish Lake and showed carp biomass at 88.7 +/- 69.2.
3.3 BUCK LAKE

Buck Lake is a small lake (23 acres) located downstream of Fish Lake in the upper watershed. The maximum depth is 9 feet; no numerical average depth given but average depth is noted as shallow. It is assumed, based on maximum depth that the entire lake is littoral. Buck Lake receives water from the connecting channel to Fish Lake and from the watershed to the East. Buck Lake then outflows to the north through a large wetland complex to Spring Lake.

![Buck Lake Map](image)

**Figure 7.** Buck Lake Map

**INTERNAL LOADING**

The watershed to lake ratio for Buck lake is quite high: ~837:1, which may result in a large amount of phosphorus loading to Buck Lake from the surrounding watershed. The average TP concentration for Buck Lake between 2014 and 2017 was 112.56 µg/l (almost twice the state standard).

While not specifically assessed, anoxic conditions within Buck Lake may be contributing to the phosphorus load through anoxic release within sediments. No assessment has been completed on the sediments in the Buck Lake basin to determine the sediment release rate of TP.

**FISHERIES ASSESSMENT**

Very preliminary survey data from fall 2019 indicates that carp have low populations on Buck Lake. The widespread presence of aquatic vegetation in Buck Lake also may hint at a low density of rough fish presence in the lake. Typically, lakes that support high rough fish density are incapable of supporting dense or widely-distributed aquatic vegetation.
3.4 SPRING LAKE

Spring Lake is the second largest basin in the PLSLWD. The maximum depth is 34 feet with an average depth of 18 feet. Roughly half (49% or 290 acres) is identified as the littoral area. The watershed is quite large (12,340 acres) with a watershed to lake ratio of 20:1, which is a moderate ratio.

Spring Lake has three (3) major inflows located primarily on its southern and western sides. The 12/17 wetland on the northwest side of the lake also contributes to the overall water budget. County Ditch 13 provides the largest contribution to external load. Spring Lake outlets on its eastern side via a small channel which connects to Upper Prior Lake.

![Spring Lake Map](image)

**Figure 8.** Spring Lake Map

**INTERNAL LOADING**

Internal loading constitutes the bulk of the total phosphorus load to Spring Lake at 5,161 lbs/year or 49%. Internal loading may be from anoxic sediment release of phosphorus, senescence of aquatic vegetation during the growing season, and overabundant rough fish. The 2012 TMDL attributed the entire internal load to anoxic release; however subsequent fisheries surveys documented elevated carp biomass which may be heavily influencing the internal phosphorus load and subsequently, water quality in Spring Lake.

**FISHERIES ASSESSMENT**

Past surveys show elevated carp biomass in Spring Lake, which is influencing internal loading. In winter 2012, the PLSLWD marked 1,752 adult carp by inserting floy tags in the dorsal area. The carp were initially captured using a commercial fishing crew that deployed a seine net around a winter
aggregation of common carp. The carp were captured, measured for length and weight, tagged, and released. An attempt was made to recapture the carp in 2013, but was unsuccessful.

Past surveys show elevated carp biomass in Spring Lake, which is influencing internal loading. A 2014 study completed by St. Mary’s University using a catch per unit effort (CPUE) model showed that carp biomass in Spring Lake was 343.5 kg/ha. A subsequent survey completed in 2016 by WSB showed 122.5 kg/ha using the CPUE method and 84.7 kg/ha using a mark-recapture methodology. Using this abundance estimate and LaMarra’s estimation of calculating loading due to an abundance of rough fish, nearly 2.37 pounds of phosphorus per day were being added to Spring Lake. This number equates to an estimated loading rate of over 866 pounds of phosphorus per year caused by the overabundance of common carp.

![SPRING LAKE POPULATION ESTIMATE 2014-2020](image)

**Figure 9.** Spring Lake Population Estimate 2014 - 2020

**PAST CARP MANAGEMENT EFFORTS**

Carp in Spring Lake were netted and inspected for marks on January 30, 2017 as part of a recapture and removal event capturing 2,577 individual carp, an estimated 59.9 kg/ha of carp biomass resulting in a reduction of 615.5 pounds of phosphorus per year. Using the ratio of marked to unmarked carp, WSB calculated a pre-removal population estimate of 3,623 ± 1,167 individual carp in Spring Lake. Using a 5.6 kg average weight, Spring Lake carp biomass was calculated at 84.9 ± 27.3 kg/ha, close to the ecological threshold value of 100 kg/ha and well above the value of 30 kg/ha that PLSLWD has identified as a biomass goal. Biomass calculated after removal is estimated to be 24.5 kg/ha ± 7.9.

During 2018 and 2019 there were not successful seine removal events and the population rebounded quickly. In the spring and summer of 2020, PLSLWD decided to add Accelerated Carp Management Strategies and different removal techniques to its toolbox. As of September 1st, a total
of 8,070 pounds of carp have been removed from Spring Lake using these new tools, as well as another 3,078 pounds using traditional open water seines.

3.5 ARCTIC LAKE

Arctic Lake is 33 acres in size with a maximum depth of 30 feet and an average depth of 9.5 feet. Arctic Lake flows into Upper Prior Lake, entering a large shallow bay on the north side of the lake through an man-made channel. Arctic Lake’s watershed is 507 acres resulting in a 15:1 watershed to lake ratio, which is relatively small. Most of the watershed (56%) is composed of wetlands and woodlands with the remaining portions of the watershed composed of residential, prairie, water, open space, and cropland.

![Arctic Lake Map](image)

**Figure 10.** Arctic Lake Map

INTERNAL LOADING

Sediment release rates from sediment coring was not available at the time the 2013 diagnostic report was drafted. However, HDR attempted quantify the internal load from anoxic sediment release using a mass balance approach. Results of this analysis showed that annual loading ranged from 177-327 lbs TP/year.

FISHERIES ASSESSMENT

Carp have been documented in multiple fish surveys completed in 2012, 2014, 2017, and 2018. The 2012 survey utilized standard and mini trap nets to determine assemblage and size structure. Small carp (9.5-13”) were captured in trap nets which indicates recruitment and suggests that Arctic Lake was functioning as a nursery. The 2014 electrofishing survey determined that the carp biomass density was 264.5 kg/ha and found numerous young of the year carp.
A carp mark-recapture population and biomass estimate were completed in 2017. Survey data shows that the carp biomass for Arctic Lake was 462.6 kg/ha, with juvenile carp dominating the biomass (336.9 kg/ha) and adults making up a smaller portion of the biomass (125.7 kg/ha). Note that a carp barrier was installed in 2016 at the connection to Upper Prior from Arctic, which may have prevented migration out of Arctic to Upper Prior, resulting in higher biomass than in 2014.

PAST CARP MANAGEMENT EFFORTS

In 2017 to 2018, an estimated 398 kg/ha of carp biomass was removed from Arctic Lake resulting in a reduction of 230 pounds of phosphorus per year. The monitoring of the recruitment rates of young carp to the system is likely to continue through the partnership these groups formed in 2013 and the actual effects of this removal on the phosphorus concentrations will be monitored by regular sampling throughout the growing months (May-September) of each year.

### Table 4. Arctic Lake Biomass & Loading Rate Before & After Removals

<table>
<thead>
<tr>
<th></th>
<th>CARP BIOMASS ESTIMATE (KG/HA)</th>
<th>PHOSPHORUS LOADING RATE (LBS/YEAR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BEFORE REMOVAL</td>
<td>460.0</td>
<td>265</td>
</tr>
<tr>
<td>REDUCTION AMOUNT</td>
<td>-398.0</td>
<td>-230</td>
</tr>
<tr>
<td>AFTER REMOVAL</td>
<td>62.0</td>
<td>35</td>
</tr>
</tbody>
</table>

3.6 UPPER PRIOR LAKE

Upper Prior Lake is 416 acres in size with a maximum depth of 43 feet and an average depth of 10 feet. The littoral zone covers 329 acres or 79% of the basin. The lake receives water from Spring and Arctic.
Lakes as well as from a small drainage area on the east side of the lake. The watershed is 16,038 acres resulting in a watershed ratio of 38:1.

**INTERNAL LOADING**

The internal load of Upper Prior is a major cause of water quality impairment in Upper Prior Lake. The 2012 TMDL indicates that 50% of the total phosphorus budget comes from internal loading. The TMDL assigns the entire internal load to anoxic sediment release; however, Upper Prior supports elevated carp biomass which may contribute and/or exacerbate internal loading.

With the upstream alum treatment of Spring Lake to reduce internal nutrient loading, lower concentrations of phosphorus are reaching Upper Prior Lake. However, past studies have indicated that there is still an internal reservoir of phosphorus in Upper Prior Lake that continues to hinder the improvement of water quality in the lake.

**FISHERIES ASSESSMENT**

A number of carp were marked with a right pelvic and pectoral fin clip, radio tags, and passive integrated transponder (PIT) tags in Upper Prior Lake in 2015 and 2016. A mark-recapture estimate was calculated using the total number of fin clips and radiotags captured.

The biomass estimate as a result of this mark-recapture event was 13,840 ± 3,664 individuals in Upper Prior Lake before the removal. Using a 6 kg average weight, Upper Prior Lake biomass was calculated at 531.3 kg/ha ± 140.6, a biomass well above the 30kg/ha biomass goal identified by the PLSLWD.

Using LaMarra’s estimation of loading due to an abundance of rough fish, nearly 10.54 pounds of phosphorus per day were being added to Upper Prior Lake as a result of this elevated population. This number equates to a loading rate of over 3,840 pounds of phosphorus per year caused by the overabundance of common carp.
PAST CARP MANAGEMENT EFFORTS

In the fall and winter of 2017-18, an estimated 113 kg/ha of carp biomass were removed from Upper Prior Lake resulting in a reduction of 845.8 pounds of phosphorus per year.

In the spring of 2019, two seine nettings and one electrofishing effort were completed in Crystal/Mud Bay, removing a total of 10,000 pounds of carp from Upper Prior Lake.

In the spring and summer of 2020, PLSLWD decided to add Accelerated Carp Management Strategies and different removal techniques to its toolbox. As of September 1st, a total of 8,142 pounds of carp have been removed from Upper Prior Lake using these new tools, as well as another 10,450 pounds using traditional open water seines.

The monitoring of the recruitment rates of young carp to the system is continuing on a yearly basis and the actual effects of this removal on the phosphorus concentrations will be monitored by regular sampling throughout the growing months (May-September) of each year.

3.7 LOWER PRIOR LAKE

Lower Prior Lake is the largest basin in the watershed at 940 acres. It has a maximum depth of 56 feet and an average depth of 13 feet; roughly 39% of the lake or 373 acres is in the littoral zone.

Water flows into Lower Prior from Upper Prior under the County Highway 21 Bridge and is the only major inflow; the remaining hydrology is derived from direct drainage from adjacent upland areas. The lake’s outlet is the Prior Lake Outlet Channel (PLOC) located along the western portion of the lake. The watershed of Lower Prior is 18,904 acres, resulting in a moderately-sized 20:1 watershed to lake ratio.

Figure 13. Lower Prior Lake Map
INTERNAL LOADING

The 2013 Diagnostic report discusses internal loading from sediment release as a possible source of loading but does not quantify the potential loading from this source.

FISHERIES ASSESSMENT

Carp are present in Lower Prior Lake and may travel freely between Lower Prior and Upper Prior Lakes through the existing connection under Eagle Creek Avenue (County Road 21). However, a biomass estimate completed in 2016 using a catch per unit effort (CPUE) model indicates that the annual load from carp is 158 lbs TP/year. Based on this, carp are not a significant source of phosphorus to Lower Prior Lake.

3.8 JEFFERS POND

Jeffers Pond is located downstream of Lower Prior along the PLOC. Jeffers Pond is divided into two basins (East and West Jeffers) separated by a narrow land bridge. The PLOC flows into the south side of West Jeffers and flows out on the north side of East Jeffers. The basins are connected by a series of cascading streams. Jeffers is 39 acres in size with a maximum depth of 70 feet (no average depth listed, total acreage includes both basins).

Figure 14. Jeffers Pond Map
INTERNAL LOADING

No diagnostic study has been completed to determine the phosphorus load (internal or external) to Jeffers Pond, nor is there any water quality data available to determine the impairment status of Jeffers Pond.

FISHERIES ASSESSMENT

MnDNR lake fisheries surveys from 2016 suggest that common carp is a potential carp nursery site, as many juvenile carp were documented. This could potential be source for new recruitment to Pike Lake downstream. Anecdotal information suggests that carp are possibly present in nuisance levels in Jeffers Pond.

3.9 PIKE LAKE

Pike Lake is the downstream-most basin in the watershed; located along the PLOC at the northern end or bottom of the watershed. Pike is 50 acres in size with a maximum depth of 9 feet and an average depth of 7 feet, resulting in the entire basin being littoral. The west side of Pike Lake is part of the PLOC and receives constant flow through the system. The east side of Pike Lake is more stagnant and receives runoff from the nearby feedlot and agricultural lands across the road to the east, creating a contrast in water quality compared to the west side.

Figure 15. Pike Lake Map
INTERNAL LOADING

Based on available water quality data, Pike Lake is listed as impaired for nutrients. The 2020 Lower Minnesota River Watershed TMDL Report identified benthivorous fish, such as common carp, as a “phosphorus source that is higher priority for targeting”, along with sediment release and curly-leaf pondweed as internal phosphorus sources to Pike Lake. With an internal load of 2,957 lbs of phosphorus per year, the study recommended reducing internal loading by 99% in the east basin and 87% reduction in the west basin.

FISHERIES ASSESSMENT

SMSC completed a Pike Lake Fishery Assessment in 2020. This study concluded that the carp population is likely as much as three times the level recommended by the MnDNR at 100 kg/ha. While this initial study was only able to grab a small sample, it did conclude that the carp population is at 287.2 ± 137.9 kg/ha. SMSC’s assessment is part of a larger carp management project that is funded by a grant that goes through the end of 2021, and includes tracking and removals.

When overlaying the age structure of carp with bluegill ages in Pike Lake, it is interesting to note that all the carp analyzed were between 5.5 and 9.5 years old at capture. All samples of bluegill were all younger than four years. This shows a direct relationship between bluegills and carp.

**Carp & Bluegill Age Structure Comparison**

![Carp & Bluegill Age Structure Comparison](image)

*Figure 16. Carp & Bluegill Age Structure Comparison in Pike Lake (2020)*
PART 4 - CARP MANAGEMENT GOALS

Through this IPM Plan, the District has developed a holistic approach to carp management, treating the entire connected watershed system as a whole. While it is the long-term goal of the District to see all of its lakes reach the water quality goal of 30 kg/ha of carp, the lakes must be prioritized and management focused to address the most imperative concerns first. As carp management information on the lakes and new techniques are always changing, this IPM Plan will address three-year goals.

4.1 PRIORITY LAKES

While it is the District's long-term goal to maintain carp populations below the water quality management level on all waterbodies, this IPM Plan prioritizes those lakes that receive the most public use and those that are most affected by poor water quality, as well as their associated waterbodies that may harbor or support carp recruitment.

PUBLIC ACCESS LAKES

The four lakes in the PLSLWD with public access are listed below with highest public use listed first:

1) Lower Prior Lake
2) Upper Prior Lake
3) Spring Lake
4) Fish Lake

Of these four, only Upper Prior Lake and Spring Lake have documented detrimental levels of carp.

TMDL LAKES

A review of Minnesota Pollution Control Agency’s website on December 18, 2018 shows the list of impaired waters located within the PLSLWD as identified in the table below. For these lakes, only Spring and Upper Prior have approved total maximum daily load (TMDL) reports and an associated TMDL implementation plan completed. Pike Lake and Fish Lake TMDL reports were completed in 2020 as part of the Lower Minnesota River Watershed TMDL.

<table>
<thead>
<tr>
<th>WATER BODY</th>
<th>YEAR LISTED</th>
<th>AFFECTED USE</th>
<th>POLLUTANT OR STRESSOR</th>
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<tr>
<td>Fish Lake</td>
<td>2002</td>
<td>Aquatic recreation</td>
<td>Nutrient/eutrophication biological indicators</td>
</tr>
<tr>
<td></td>
<td>2006</td>
<td>Aquatic consumption</td>
<td>Mercury in fish tissue</td>
</tr>
<tr>
<td>Lower Prior Lake</td>
<td>2002</td>
<td>Aquatic consumption</td>
<td>Mercury in fish tissue</td>
</tr>
<tr>
<td></td>
<td>2018</td>
<td>Aquatic life</td>
<td>Fishes bioassessments</td>
</tr>
<tr>
<td>Pike Lake</td>
<td>2002</td>
<td>Aquatic Recreation</td>
<td>Nutrient/eutrophication biological indicators</td>
</tr>
<tr>
<td>Spring Lake</td>
<td>1998</td>
<td>Aquatic Consumption</td>
<td>Mercury in fish tissue</td>
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<tr>
<td></td>
<td>2002</td>
<td>Aquatic Recreation</td>
<td>Nutrient/eutrophication biological indicators</td>
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<tr>
<td></td>
<td>2002</td>
<td>Aquatic Recreation</td>
<td>Nutrient/eutrophication biological indicators</td>
</tr>
</tbody>
</table>
**PRIORITY LAKES DETERMINATION**

As they are listed as Tier 1 Lakes in the PLSLWD’s 2020-2030 Water Resources Management Plan, receive the highest public use, and are currently on the state’s impaired waters list, the District has established the following two lakes as its top carp management priority:

- Upper Prior Lake
- Spring Lake

In addition, the PLSLWD supports the efforts of SMSC as the lead partner on tracking and reducing carp populations in Arctic and Pike Lakes. Arctic Lake is directly connected to Upper Prior Lake and Pike Lake has a current TMDL that has identified rough fish as a major contributor to internal loading. As such, the PLSLWD has established the following two lakes as its secondary supportive carp management priority:

- Arctic Lake
- Pike Lake

### 4.2 COST-BENEFIT ANALYSIS

The PLSLWD attempts to be as cost-effective as possible in all of its practices. In 2020, the PLSLWD completed a cost-benefit analysis comparison on its carp program compared to other District projects (see Attachment C). A 10-year annualized cost was used to compare the carp management program results on Upper Prior Lake to other projects in the District:

**Cost-Benefit Comparison of District Projects**

*(Based on 10-Year* Annualized Total Cost of a Project)*

<table>
<thead>
<tr>
<th>$ / lb TP Removed</th>
<th>Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>$81</td>
<td>Upper Prior Lake Alum Treatment <em>(based off grant information)</em></td>
</tr>
<tr>
<td>$97</td>
<td>Carp Management Project <em>(based on 2015-present costs &amp; results)</em></td>
</tr>
<tr>
<td>$202</td>
<td>Ferric Chloride System <em>(Note: based on 25-year annualized cost)</em></td>
</tr>
<tr>
<td>$252</td>
<td>Fish Point Park Iron-Enhanced Sand Filter</td>
</tr>
<tr>
<td>$1,131</td>
<td>Indian Ridge Biofiltration Basin</td>
</tr>
<tr>
<td>$1,136</td>
<td>Fairlawn Shores Biofiltration Basin</td>
</tr>
</tbody>
</table>

Based on this analysis, the PLSLWD concluded that carp management was indeed cost-effective. However, all the different carp removal tools do not always produce the same result. To that effect, the PLSLWD will also consider cost-benefit when choosing carp management goals and tools. At some point, the PLSLWD may decide that reducing carp populations from 50 kg/ha to 30 kg/ha would not be worth the cost, as it is increasingly more expensive to reduce carp populations when the existing biomass is already low. This will be assessed during each annual update of the IPM Plan.

### 4.3 CARP MANAGEMENT STRATEGIES & GOALS

The PLSLWD has three distinct overarching strategies for carp management. At the direction of the Board of Managers, there are two accelerated carp management goals for Upper Prior and Spring Lakes to reduce and maintain overall carp populations to below the water quality threshold. To help achieve successful long-term management without carp population rebound, it is important to also take steps to...
block recruitment and to understand how the connected system works as a whole to better management the carp population.

**CARP MANAGEMENT STRATEGIES:**

1) **Comprehensively TRACK** carp to improve the understanding of carp dynamics, behavior, and movement that will inform effective management decisions.

2) **Effectively BLOCK** all identified carp spawning areas connected to Upper Prior & Spring Lakes.

3) **REDUCE** carp down to management goal levels in priority lakes:

**CARP MANAGEMENT GOALS:**

<table>
<thead>
<tr>
<th>PRIORITY</th>
<th>WATER BODY</th>
<th>CURRENT CARP BIOMASS</th>
<th>CARP BIOMASS GOAL</th>
<th>TIMELINE / NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>Upper Prior Lake</td>
<td>259.7 kg/ha</td>
<td>&lt; 30 kg/ha</td>
<td>Achieve goal by 2021</td>
</tr>
<tr>
<td>#1</td>
<td>Spring Lake</td>
<td>250.6 kg/ha</td>
<td>&lt; 30 kg/ha</td>
<td>Achieve goal by 2021</td>
</tr>
<tr>
<td>#2</td>
<td>Pike Lake*</td>
<td>287.2 kg/ha</td>
<td>&lt; 100 kg/ha</td>
<td>SMSC is the lead; Achieve goal by 2022</td>
</tr>
<tr>
<td>#2</td>
<td>Arctic Lake*</td>
<td>62.0 kg/ha</td>
<td>&lt; 100 kg/ha</td>
<td>SMSC is the lead; Maintain levels</td>
</tr>
</tbody>
</table>

* Note that PLSLWD takes only a supportive role in carp management.

Previous studies demonstrate that carp biomass densities of 100 kg/ha are ecologically damaging. To effectively manage and maintain carp below this threshold, an initial reduction to a density of 30 kg/ha has been recommended for the two top priority lakes. By managing at a lower level, early detection of potential recruitment events may provide managers an opportunity to address the increase in carp population and biomass before it returns to a damaging level. Once this milestone has been achieved and recruitment has been managed, the PLSLWD may consider working towards the 30 kg/ha goal for other lakes in the District.

- **Goal #1:** Reduce carp populations to 30 kg/ha in Upper Prior Lake.
- **Goal #2:** Reduce carp populations to 30 kg/ha in Spring Lake.
PART 5 - IPM STRATEGIES

For years after the introduction of carp in the United States, various government agencies and other entities attempted to manage and mitigate carp populations simply through large-effort mass removals. This one swing approach did not include quantifying the amount of carp before or after these efforts, or blocking carp recruitment. Without baseline carp population information, this management method proved to be ineffective as managers were not able to quantify the extent of the invasion and did not know when they were “done”. Carp often recolonized waterbodies since a long-term approach was not implemented, and spawning areas remained open and available. This management approach was largely abandoned in the late 1900s.

Ideas and strategies have since been adapted from management practices being used in Australia (Diggle et al., 2012) and by studying movement and behavior patterns of carp in the Upper Midwest. In the early-2000s the University of Minnesota Aquatic Invasive Species Research Center (MAISRC) instituted research to develop a sustainable approach to effectively mitigating and controlling common carp in the United States. This research showed that by addressing different life stages and developing an understanding of the entire system or watershed sustainable carp control could be possible. The following diagram illustrates considerations to be made in the development of a carp IPM for the Prior Lake-

While commercial fishing efforts (seines) are not an effective means to control carp populations by itself, it can be a valuable component of an integrated pest management plan for long-term population management.
5.1 TRACK

Before implementation of BLOCK and REDUCE activities, the extent of the problem needs to be addressed. There are three questions that need to be answered:

1) How many carp are in the system?
   → Population estimates
   → Setting removal goals

2) Where and when do carp travel and aggregate in the system?
   → Identify migration routes between waterbodies
   → Locate areas where carp are aggregating to aid in removal efforts

3) What basins are the carp using to spawn?
   → Identify potential locations for carp barriers
   → Use to locate potential spawning trap locations

A. DATA COLLECTION TOOLS & TECHNIQUES

Whatever method that is used to estimate carp populations, the first step is always to capture the carp for counting and measuring. This can be completed using a variety of methods.

COLLECTING CARP:

Electrofishing. An electric field is generated between anodes and cathodes placed in the water. The current causes muscle contraction and temporary paralysis in fish; most species will float to the surface where they can then be netted. Stunned fish usually recover quickly when the power is switched off. Unfortunately, fish in deep water are not often captured, so this technique is best used in shallower areas near the shore. Different electrofishing methods (e.g. backpack, bank-mounted and boat, including electroseining) are used depending on local site conditions. Note: This method is also used for small scale removals.

Gill Netting. Mesh net panels are placed vertically in the water to entangle fish. The net has a rope along the top with floats attached and another rope along the bottom with weights attached. The mesh of a gill net is uniform in size and shape and the netting is large enough for a fish to fit its head through, but not its body, trapping them in place. Note: When employed with commercial fishermen and with permission from the MnDNR, this method is also used for larger-scale removals.

Fyke Nets. Collapsible, cone-shaped trap nets, held open by hoops. Leader net panels or wings guide fish towards the trap entrance. Due to their size and placement in shallow locations, fyke nets are effective for catching smaller carp.

Large-Scale Removal Events. While not its main purpose, data is collected during large scale removal events to better estimate current carp populations and removal efforts. These methods include seines, baited box traps, specialized trap nets, and commercial gill netting.

After the carp have been captured, counted, and measured, they are tagged and re-released into the waterbody in order to track their movement and monitor their populations. This tagging effort is completed through a variety of tools used to track carp as listed below.
TRACKING CARP:

**Passive Integrated Transponder (PIT) Tags.** PIT tags act as a lifetime barcode for an individual carp and when scanned are as reliable as a fingerprint (Gibbons & Andrews 2004). The tag is usually between 10 and 14 mm long and 2 mm in diameter. PIT tags are injected with a needle or inserted by surgical incision under the skin of the fish. PIT tags are dormant until activated; they therefore do not require any internal source of power throughout their lifespan. To activate the tag, a low-frequency radio signal is emitted by a scanning device that generates a close-range electromagnetic field. The tag then sends a unique alpha-numeric code back to the reader (Keck 1994). Scanners are available as handheld, portable, battery-powered models and as stationary, automated receiver devices that are used for automated scanning. PIT tag receivers are strategically placed in suspected carp migratory routes to determine movement behaviors in those channels.

**Radio-Tags.** A radio-tag consists of a 2.5 inch long cylinder which is surgically inserted inside the body of the carp with a foot long antenna extending outside of its body. Unlike PIT tags, radio-tagged fish can be located manually and tracked in real-time with an antennae from a boat or from on top of the ice in winter. Radio-tags implanted in the carp should last for about three years, providing the District with key information about where the carp gather to overwinter and where they go to spawn. Each radio tag has a unique frequency, which can be picked up from up to a mile away with the tracking antennae device.

**Fin Clips / Plastic Tags.** In order to determine population estimates, carp are sometimes marked with a unique fin clip for the waterbody (e.g. right dorsal fin, pectoral fin, etc.) which does not harm the fish but leaves an identifiable marker. In other studies, carp have been marked with plastic tags that are inserted into the body of the fish and are similar-looking to retail clothing tags.

**POPULATION ESTIMATE TECHNIQUES:**

**Mark-Recapture Estimate.** To complete a mark-recapture estimate of abundance, captured carp will be marked with a unique mark (e.g. a fin clip, a plastic tag, a PIT tag, or a radio-tag), measured for length and weight, and released back into the basin that they were captured. Subsequent surveys will note the ratio of marked to un-marked fish and a population estimate will begin to develop using this method of estimation. This method assumes that marked carp are redistributed with the unmarked population, meaning
that sufficient time (upwards of one-week) must be given between the date of marking a carp to the recapture event (Chapman, 1951). It also assumes that no emigration or immigration of the species occurs in the lake during the survey period. This method of estimation will be evaluated throughout the project period in case one or more of these assumptions is being violated.

**Catch Per Unit Effort (CPUE) Survey.** CPUE boat electrofishing surveys can be used to estimate carp abundance and to predict the density of adult common carp in some cases (Bajer, 2012). These surveys are completed in the late summer to early fall and over the span of one to two months. Ideally, up to three (3) separate electrofishing surveys in each lake are conducted to establish an average CPUE. Surveys will consist of at least three (3) 20-minute transects that cover shoreline and littoral zones that are suitable habitat for carp. Time spent, number of carp captured, and length and weight data are recorded. A population and biomass estimate of common carp are then calculated using this data in a CPUE model developed for using the protocol and gear described and reflects the population at the time of the survey (Bajer et al., 2012). An average of multiple surveys aims to develop a more robust estimate over a larger span of time.

**B. CARP ABUNDANCE ESTIMATES**

**OBJECTIVE 5.1.B (1): Establish abundance estimates for each of the carp management waterbodies in the PLSLWD.**

For this plan, the abundance of carp is defined as the number of individuals and the amount of biomass present within each waterbody, reported in kilograms per hectare. To determine the abundance of carp within the system, two methods have been deployed: a mark recapture population estimate and an electrofishing catch per unit effort (CPUE) model. The protocol used for these methods of estimation are described above.

As the PLSLWD implements carp management activities (removal, barriers, etc.), it will be important to monitor changes in carp abundance on these lakes to determine if these efforts are successful in suppression of carp population post-management or if adjustments to existing strategies or new strategies are necessary. See Part 3 for specific information on current populations of individual lakes.
### Table 7. Carp Biomass & Phosphorus Loading in PLSLWD Carp Management Lakes

<table>
<thead>
<tr>
<th>Lakes in Order of Priority</th>
<th>Year</th>
<th>Carp Biomass Estimate (kg/ha)</th>
<th>Estimated Total Weight (lbs)</th>
<th>Phosphorus Loading Rate (lbs/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper Prior Lake*</td>
<td>2020</td>
<td>250.4 ± 79.1</td>
<td>87,441</td>
<td>1,431</td>
</tr>
<tr>
<td>Spring Lake*</td>
<td>2020</td>
<td>242.1 kg/ha ± 50.0</td>
<td>128,114</td>
<td>1,220</td>
</tr>
<tr>
<td>Pike Lake**</td>
<td>2020</td>
<td>287.2 ± 137.9</td>
<td>12,792</td>
<td>100.39</td>
</tr>
<tr>
<td>Arctic Lake**</td>
<td>2018</td>
<td>62.0 kg/ha</td>
<td>1,094</td>
<td>7.24</td>
</tr>
<tr>
<td>Fish Lake</td>
<td>2019</td>
<td>88.7 +/- 69.2</td>
<td>13,886</td>
<td>46.89</td>
</tr>
<tr>
<td>Lower Prior Lake</td>
<td>2018</td>
<td>8.9 kg/ha</td>
<td>7,593</td>
<td>23.71</td>
</tr>
<tr>
<td>Jeffers Pond</td>
<td>-</td>
<td>unknown</td>
<td>unknown</td>
<td>unknown</td>
</tr>
<tr>
<td>Buck Lake</td>
<td>-</td>
<td>unknown</td>
<td>unknown</td>
<td>unknown</td>
</tr>
</tbody>
</table>

* Carp Management Top Priority Lakes
** Carp Management Secondary Priority Lakes (supportive role only)

### OBJECTIVE 5.1.B (2): Develop a baseline understanding of recruitment patterns in waterbodies that connect to the two top priority lakes.

Although spawning observations can suggest areas for recruitment, the strength of these recruitment events is not known without sampling using nets or electrofishing in these basins. To help determine priority waterbodies to block movement to or from, it is recommended that steps be taken to sample basins suspected for recruitment. Radio-tags and PIT tags can be used to help document springtime movement by adults and basins can guide sampling decisions. Trap netting can be used for small sampling efforts.

### Table 8. Carp Survey Status of Potential Spawning Sites Connected to Priority Lakes

<table>
<thead>
<tr>
<th>Waterbody</th>
<th>Presence/Absence Survey</th>
<th>Carp Biomass Estimate (kg/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geis Wetland</td>
<td>Present</td>
<td>183.0 +/- 83.6 (2018): surveys on 8/13, 8/15, 10/4 54.3 +/- 12.1 (2019): survey on 8/15/19</td>
</tr>
<tr>
<td>Northwood Pond</td>
<td>Present</td>
<td>unknown</td>
</tr>
<tr>
<td>Tadpole Pond</td>
<td>Present</td>
<td>unknown</td>
</tr>
<tr>
<td>Charlie’s Wetland</td>
<td>Absent</td>
<td>unknown</td>
</tr>
</tbody>
</table>

### C. CARP SPATIAL USAGE

Determining how carp use the system is critical to the development of the carp IPM plan. Understanding movement patterns will allow PLSLWD staff to identify potential nursery sites, migration routes, and wintering areas where carp may be vulnerable to large scale biomass removal or blockage to movement to limit recruitment (Bajer, 2011).
To track movement, the PLSLWD has deployed several high frequency radio tags implanted in carp (Judas fish) as well as passive integrated transponder (PIT) tags with three (3) PIT tag monitoring stations. PLSLWD and WSB staff have actively tracked radio-tags using a 3-element Yagi antennae since 2015. Survey frequency was greatest during the spring spawning period (once/week) and during the winter aggregation period when ice conditions were safe enough for foot travel (once/week). The remainder of the year, radio telemetry surveys were completed on an infrequent and irregular basis.

The District has also acquired two stationary cameras to be placed at strategic locations to confirm carp migration routes and/or aggregations of carp during spawning season. These cameras are set up wirelessly and transmit real-time information so that staff can move quickly to coordinate carp removals at optimal times.

**OBJECTIVE 5.1.C (1): Identify carp aggregations on Spring Lake and Upper Prior Lake**

Winter-time telemetry surveys and past studies have proven that carp tend to aggregate together in large groups during the winter (Johnsen, 1977; Penne, 2008). This phenomenon allows for these aggregations to be targeted for removal using under ice netting techniques, thus the identification of carp wintering areas on Spring Lake and Upper Prior Lake was determined to be a main objective in the 2015 carp management project.

Radio-tagged carp have been periodically monitored since 2015 to identify winter carp aggregation areas that could be targeted for carp biomass removal. Three (3) distinct sites were identified, both of which commercial fishermen have been able to pull a seine net through.

*Figure 20. Identified Spring Lake Carp Aggregation Areas Suitable to Seine*

Three full winters of telemetry data are available to identify winter aggregation areas on Upper Prior Lake and four (4) distinct sites have been identified where carp tend to aggregate, mainly
in the winter. Locations 1-3 depicted on Figure 6 have been successfully seined, but location 4 has a significant presence of rocks on the lake bottom and is not suitable for netting.

![Figure 21. 2016-2020 Upper Prior Lake Carp Aggregation Areas Suitable to Seine](image)

Radio-tags will continue to be tracked, mapped and documented to identify new and continued areas that carp are congregating on Upper Prior and Spring Lakes.

**OBJECTIVE 5.1.C (2): Visually monitor carp at spawning areas to identify aggregations at connections to Spring and Prior Lakes.**

Using staff, volunteers, and stationary cameras, monitor the locations at or near Upper Prior or Spring Lakes that are suitable for small-scale carp removals when fish begin aggregating in the spring. This information will be used to coordinate electrofishing, gill-netting, micro-hauls, or seine netting carp removals with consultants and/or commercial fishermen.

**OBJECTIVE 5.1.C (3): Map migration routes and identify connected nursery sites for Upper Prior and Spring Lakes.**

Migration routes that allow access to shallow basins that carp exploit for use as nursery sites are the support mechanism for carp recruitment in those systems where carp spawn outside the main basins. Carp have evolved to seek out these sites since hard winters in Minnesota periodically freeze shallow basins resulting in winter-kill of most or all fish species. Absence of predator species, such as bluegill sunfish, greatly increase the chance for survival of carp eggs and larvae. Radio-tags and passive integrated transponder (PIT) tags and stationary receivers are currently being used to track the movement of carp each season (Appendix C).

Carp movement out of the Spring Lake and Upper Prior Lake system is being studied using the same radio-tags used in the Judas fish technique to find carp winter aggregations. Several apparent surface connections exist on Spring Lake and Upper Prior Lake and in some cases,
anecdotal information suggests that carp are using a connection even though no radio-tags have been detected moving. In response to this, the PLSLWD initiated a study using Passive Integrated Transponder (PIT) tags and seven (7) unmanned receivers/loggers placed in streams to detect movement and quantify the extent of movement in locations of highest priority. In addition, SMSC has their own additional PIT tag station at the outlet to Pike Lake.

**Figure 22.** PIT tag receiver locations in 2020
Tagged carp are suspected to have traveled between Upper Prior Lake and Arctic Lake after the barrier was installed in 2016. Additional PIT tags in Arctic will help confirm or deny whether or not carp are finding another way to travel between the two waterbodies.

PIT tag stations at the Northwood barrier, Arctic Lake outlet and the FeCl temporary barrier help the District verify if these barriers are sufficiently working to prevent carp migration during spawning. Spring 2020 results show that all three systems are effectively blocking movement.

### 5.2 BLOCK

#### A. BIOLOGICAL CONTROLS

Research completed by the MAISRC showed that bluegill sunfish are the main predator of carp, preying on the eggs and larvae of carp young of year. Carp actively seek out nursery sites that are devoid of these predator fish and proliferate in lakes where bluegill abundance is low. A robust panfish and gamefish population may act as biological control and compliments the other IPM strategies (Weber et al., 2012). These predator fish are necessary to prevent carp recruitment after a significant portion of the carp biomass has been removed or to keep carp from establishing in lakes.

Larger gamefish may also prey upon carp young of the year, but that relationship is not as well documented. Also, carp growth rates are quite accelerated compared to other fish species. By
the second growing season (age 1) carp may be > 12 inches, reducing the likelihood that piscivorous fish species will be able to prey upon them.

In 2017, the PLSLWD partnered with the University of Minnesota as part of a graduate research project to assess the effectiveness of using bluegill sunfish as biocontrol for common carp (Poole, 2018). The eastern basin at the 12/17 wetland restoration site was one of four study basins in the Twin Cities metro area used; it was stocked with both spawning carp and adult bluegill to measure the effective rate of bluegill predation on carp eggs. The results from the study indicate that bluegill predation had a major effect on the abundance of post-larval carp. In the 12/17 wetland study basin, there 0% recruitment of carp during the study period.

**OBJECTIVE 5.2.A (1): Manage lakes & upstream spawning grounds to support a robust gamefish and/or panfish population to effectively control carp recruitment.**

MN DNR fisheries data is available for both Upper Prior, Lower Prior, Spring, and Fish Lakes. Two (2) independent fisheries studies have been completed on Arctic Lake, and a recent fisheries assessment was completed on Pike Lake. Existing data for these lakes show a variety of fish assemblages and abundances.

The remaining lakes (Buck Lake and Jeffers Pond) in the watershed have not been assessed. An initial sampling in Buck Lake did not indicate that it was a nursery and it had a good panfish population. Jeffers Pond is suspected to be a carp recruitment site and should be evaluated in 2021. A baseline fisheries assessment will be completed in 2022 using a variety of methodologies including electrofishing and netting. Data collected after the assessment will be used to prioritize if this lake needs to be managed.

An analysis of all existing fisheries data in 2021 will provide insights into each of the fisheries where such data is available, identify data gaps, and determine if the fishery is functioning to biologically control carp where necessary. Habitat improvements and other restorative efforts may be identified through this effort as well as waterbodies that may need additional survey work where minimal data is available.

As recommended by the PLSLWD’s Citizen Advisory Committee, the PLSLWD is moving forward with its first lake fish stocking event in both Spring and Prior Lakes in 2020. With donations from the Spring Lake Association and the Prior Lake Association, along with a District contribution, the PLSLWD will be stocking 2,000 bluegills and 800 walleye in both Spring Lake and Prior Lake in 2020.

**Table 11. 2020 Lake Fisheries Stocking Plan**

<table>
<thead>
<tr>
<th></th>
<th>4” – 6” BLUEGILLS</th>
<th>6” – 8” WALLEYE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prior Lake</strong></td>
<td>2,000</td>
<td>800</td>
</tr>
<tr>
<td><strong>Spring Lake</strong></td>
<td>2,000</td>
<td>800</td>
</tr>
</tbody>
</table>
**OBJECTIVE 5.2.A (2): Stock bluegills as needed in carp nursery locations connected to Upper Prior and Spring Lakes to prevent recruitment.**

In 2020, the PLSLWD began stocking the existing carp spawning sites at the Geis wetland and the Northwoods Pond with 2-4” bluegills in spring before carp migration and spawning. These bluegills were marked with fin-clips before releasing them into the wetland to aid in future assessment of stocking success.

While winter dissolved oxygen measurements show elevated oxygen levels (7 ppm) in the Geis wetland, which is high enough to support winter survival, it is unknown if the habitat is sufficient to support bluegill recruitment. The Geis wetland will be surveyed in the spring of 2021 to assess if the stocked bluegills survived.

Based on recommended stocking rates, the Geis wetland was stocked with 2,000 bluegills in the spring and another 500 will be stocked in the fall to reach the rate of 500 bluegill/surface acre. The Northwoods Pond site was stocked with 900 bluegills to reach the same rate. In the fall, the Tadpole Pond will also be stocked with 500 bluegill to ensure low recruitment in this nursery site.

**Table 12. Summary of Bluegill Stocking in Nursery Sites**

<table>
<thead>
<tr>
<th>Location</th>
<th>Spring 2020 Stocking</th>
<th>Fall 2020 Stocking</th>
<th>Potential 2021 Stocking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geis Wetland</td>
<td>2,000</td>
<td>500</td>
<td>1,000</td>
</tr>
<tr>
<td>Northwoods Pond</td>
<td>900</td>
<td>0</td>
<td>500</td>
</tr>
<tr>
<td>Tadpole Pond</td>
<td>0</td>
<td>100</td>
<td>500</td>
</tr>
<tr>
<td>Desilt Pond</td>
<td>0</td>
<td>0</td>
<td>500</td>
</tr>
<tr>
<td>Mud Bay</td>
<td>0</td>
<td>0</td>
<td>500</td>
</tr>
</tbody>
</table>

In 2021, the PLSLWD will assess the nursery locations for bluegill populations. More bluegills will be stocked at all three locations if deemed necessary to prevent carp recruitment. Other nursery locations will be analyzed in 2021 for potential bluegill stocking in the future.

**B. CARP BARRIERS**

Barriers can be an incredibly effective component of a carp IPM. Barriers may be employed to protect sensitive areas from the destructive foraging behavior of carp or prevent carp from exploiting migration routes to disrupt recruitment. Barrier placement should be balanced with the potential need for fish passage with respect to native gamefish. Placement of barriers is supported by the implementation of movement monitoring as described in section 3.1.2.

Existing carp barriers were placed throughout the Upper Prior and Spring Lake connections based on documented carp migratory information and include the following locations:
- Arctic Lake Outlet
- 12/17 Wetland (west side of Spring Lake)
- FeCl Weir (south of Spring Lake on Ditch 13)
- Desilt Pond (south of Spring Lake at Ditch 13 outlet)
- Northwoods Pond (west side of Upper Prior Lake)

![Carp Barrier Locations](image)

**Figure 23.** Barrier locations within the PLSLWD, including installed and proposed barrier sites.

**OBJECTIVE 5.2.B:** Install new barriers within carp migration routes to spawning areas as documented by tracking data or fisheries assessments.

In 2020, the PLSLWD installed one new barrier (Northwood barrier) located on the west side of Upper Prior Lake. This carp nursery site was discovered when radio-tagged carp were documented entering this waterbody during spawning season. Visual observations confirmed that it was an active spawning site.

The existing FeCl Weir barrier was also updated in 2020. This barrier system was in need of repair for nearly a decade. The new system will require less maintenance and be more effective in high water flood conditions.
The PLSLWD will be designing and building a carp barrier leading to the Tadpole Pond site for installation in 2021. Carp have been documented visiting this small waterbody to the southwest of Spring Lake during spawning season.

The PLSLWD will also continue to investigate other potential barrier locations in 2021. These locations will be identified using the tracking methods described in Section 5.1.1.

5.3 REDUCE

Carp can be removed from waterbodies using a variety of methods as documented below. PLSLWD will consider the following when deciding which removal methods to employ:

5) **Feasibility**: How likely will this method result in success? What are the obstacles?
6) **Time-Oriented**: Is immediate removal necessary to meet goal deadlines? Will the timeliness affect success of other projects (e.g. alum treatment)?
7) **Cost-Effective**: Is this method worth the cost based on anticipated results?
8) **Effort for Results**: Is this the best method for the amount of effort required? Given limitations of staff, what methods produce the greatest results for the least amount of effort?

While the IPM plan addresses the carp management strategies on a holistic, watershed-based approach, the PLSLWD is dedicated to first reaching carp management goals on its top priority carp management lakes before it works to actively manage the other six lakes.

**OBJECTIVE 5.3:** Reduce carp populations to 30 kg/ha in top priority carp management lakes: Spring and Upper Prior Lakes.

### A. CARP REMOVAL METHODS

**SEINES**

Commerical fishermen use long mesh nets that hang vertically in the water with floats along the top and weights along the bottom. They are typically used to surround fish in an area and pulled through the water and along the lake bottom to crib up the carp in a shallow area for removal. Both open water and under ice seine netting is very effective but limited to areas where carp aggregate and are snag free.

*Figure 24. Under Ice Seine on Spring Lake*
Clearing Obstructions. One of the most critical factors to a successful seine is have an area that is clear of obstructions on the lake bottom. The PLSLWD can help prepare known aggregation areas prior to seine season (November – April) by engaging a commercial fishermen to run a test seine through areas with their nets, or by running a chain on the bottom of the lake. These obstruction removals will occur on Spring Lake and Upper Prior Lake each October/early November to prep the sites if a seine event is anticipated.

The PLSLWD will also use its underwater drone to check the removal area conditions prior to a seine to avoid any new or unforeseen obstructions in an area. If there are new obstructions under the ice, they can potentially be avoided or removed prior to the seine.

Upper Prior Lake Seine Net. There has been some hesitancy by commercial fishing crews to commit resources to netting Upper Prior Lake due to the presence of aquatic invasive species (Eurasian watermilfoil, curly leaf pondweed, and zebra mussels) and the DNR’s requirement to decontaminate nets and associated equipment. Depending on the weather, the decontamination period may be up to 21 days, meaning that commercial crews may not have gear to net other high priority lakes/projects. The PLSLWD’s seine net available for use by commercial fishermen in the District should mitigate this obstacle by providing a net that could be properly decontaminated or used repeatedly in the same waterbody while not restricting the fishing crews’ ability to continuously net in other waters.
**SPECIALIZED TRAP NETS**

Mesh fish traps that have net guide walls leading fish into aggregation chambers. These are usually set in shallow water, and style and size can vary. The District has developed two specialized trap nets for netting during spawning season: the Push Trap Net that will include a one-way trap door panel on the opening, and the Newman Trap Net that will include multiple-staged guidance walls and openings for enhanced entrapment, both of which will be placed seasonally at carp spawning migratory routes.

**Newman Cage.** This design is similar to a baited box net, but rather than having to “trigger” the net by pulling up the sides to capture the carp, this net provides constant capture of carp when set. Carp swim into the trap and cannot escape. Below is an approximate version:

![Figure 26. Newman cage reference example.](image)

**Push Trap.** This trap takes advantage of the migratory behavior of carp as well as their propensity to “push” through barriers and is modeled conceptually on a design described in detail by Thwaites (2015). Initial laboratory results indicate that the push trap was successful in capturing 91% of adult carp in the experiment.

The design incorporates a row of PVC pipe fingers mounted on a crossbar and set at angles that allow carp to push through and swim upstream into a collection basin. The rotating fingers are similar to those mounted at the ferric chloride weir, which rotate on a fixed cylinder. The fingers are set at a height that allow for the forward or upstream movement of the fingers that “open” the trap, but the fingers cannot swing back to allow carp to exit the trap. The trap itself is composed of economical fencing materials.
BAITED BOX TRAPS

The baited box trap is a mesh net trap that lays flat on the bottom of the lake, but quickly forms into a box when lifted to trap the carp inside. Eight solid pipes are secured around the box and ropes are run through the net and up the poles to a pulley system. Carp are typically baited with corn at the box trap location for several days with help from volunteers until a large grouping forms. While a baited box trap catches fewer fish, it holds an advantage over a seine net because the carp are much less likely to escape.

MICRO-HAULS

Micro-hauls are simply smaller removals that are completed using a variety of methods as opportunities arise. For example, using a small 500’ section of a seine net called a “block net”, the PLSLWD is able to complete small micro-haul events when carp group up in small areas unsuitable for seining. The removal is often assisted by electrofishing efforts, small gill nets and/or the unified sound technique to drive carp towards an area. Corn may also be used to bait an area prior to a micro-haul attempt to achieve greater removal numbers.

ELECTROFISHING

This method was further described above in Section 5.1.1.

GILL NETTING

This method was further described above in Section 5.1.1.
B. ACCELERATED STRATEGIES

**OBJECTIVE 5.3.B:** Develop alternative or innovative methodologies/techniques to improve or facilitate removal of carp biomass on priority carp management lakes.

In many instances carp may become aggregated, but cannot be removed in the aggregation area due to obstructions on the bottom or along the shoreline. By developing alternative removal methodology, the PLSLWD will be able to expedite carp biomass removal and in some instances, make removal possible. By developing these techniques, the PLSLWD may be able to assist other water resource management entities in addressing carp management; especially in areas where traditional methods are difficult to employ.

The unified method may provide opportunity to enhance carp removal efforts by concentrating carp using underwater speakers; essentially using sound to herd carp to a specific location or drive them from undesirable removal locations.

**HERDING CARP**

The underwater sound system for herding carp consists of an MP3 player wired to underwater speakers and an amplifier to “pump” sound near an aggregation to drive them into nets or herd them to an area of the waterbody that is conducive to netting. This is especially effective in an area like the northeast corner of Upper Prior Lake where rock obstructions exist near the Knotty Oar Marina, as successfully attempted during an under ice seine in 2020.

**TRAINING CARP**

The District is also testing the effectiveness of training carp using sound and bait. Multiple studies have shown that carp can be trained within two weeks of consistent noise and rewards and will remember this training for as long as 4-5 months afterwards. If the District can train carp to come to a location when they hear a specific noise, this could be used to create or enhance opportunities for carp removal efforts (seines, box traps, etc.).

**FUTURE REMOVAL METHODS BEING STUDIED:**

The University of Minnesota and other colleges are studying ways to reduce the carp population by methods other than physical removal. The PLSLWD is keeping in close contact with researchers of these programs to see if the District can participate as a test site or if there research is ready to implement. Note that the projects are likely a few years away from regulatory approval of these innovative new methods listed below.

**Poison Corn Bait.** This research project is testing whether common carp can be baited and killed using corn pellets with antimycin-a, a natural fish toxin, without harming other species. Carp have a unique diet (plant seeds, such as corn, which native fish are not attracted to) and can be trained to aggregate in baited areas. Researchers first determined the concentration of antimycin-a needed and the species-specificity of the approach. They then conducted trials to test this “bait and switch” concept with carp of different sizes in experimental ponds. This research project will conclude at the end of 2021.
Genetic Sterilization. This research project is looking at introducing a synthetic species-like barrier to carp reproduction. This method involves altering the genetics of males in the invasive species (carp) before releasing them among the population, leading to sterile offspring and the eventual control of the species overall. In order to make this method usable, this study aims to develop this technology further in zebrafish, from which the system can be applied to other invasive fish species and eventually other vertebrate pests. As of July 2019, researches tested several genetic constructs in the model laboratory fish, Danio rerio., although they have not yet found a genetic design that is suitable for introduction to carp. The project will end this year, but there will be a secondary project to continue the research.

Carp Viruses. The koi herpes virus has killed off large quantities of common carp in other lakes in Minnesota, such as Lake Elysian. These die-offs lead to an interest in exploiting this carp-specific virus and introducing it into lakes infested with this invasive species. The University of Minnesota has researched the koi herpes virus, along with two other carp-killing viruses, and are in the process of researching what impacts or unintended consequences this might have on native fish. Once the virus is shown to be carp-specific and non-detrimental, there will still be a few regulatory hoops to jump through before it is allowed to be introduced into Minnesota lakes.
PART 6 - CARP MANAGEMENT SCHEDULE

The following table includes the carp activities anticipated for 2020-2021 in order to achieve the goals identified in Part 4.
### CARP MANAGEMENT SCHEDULE

#### 2020-2021

<table>
<thead>
<tr>
<th>TASK</th>
<th>START</th>
<th>END</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TRACK: Carp Tracking &amp; Project Development</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Implant carp with PIT tags &amp; Radiotags</td>
<td>Mar 2020</td>
<td>May 2021</td>
</tr>
<tr>
<td>Install/monitor PIT tag reader stations</td>
<td>Apr 2019</td>
<td>Sep 2021</td>
</tr>
<tr>
<td>Track PIT &amp; Radio tags across waterbodies</td>
<td>Apr 2019</td>
<td>Dec 2021</td>
</tr>
<tr>
<td>Update GIS location information &amp; online maps</td>
<td>Apr 2019</td>
<td>Dec 2021</td>
</tr>
<tr>
<td>Install stationary cameras at strategic locations</td>
<td>Sep 2019</td>
<td>Dec 2021</td>
</tr>
<tr>
<td>Use underwater camera for tracking/training carp</td>
<td>Sep 2019</td>
<td>Dec 2021</td>
</tr>
<tr>
<td>Analysis: identify aggregation areas, migration routes and population status</td>
<td>Jun 2019</td>
<td>Dec 2021</td>
</tr>
<tr>
<td><strong>BLOCK: Carp Barriers &amp; Biological Controls</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identify strategic locations for carp barriers</td>
<td>Oct 2019</td>
<td>Oct 2021</td>
</tr>
<tr>
<td>Site analysis &amp; design of barriers</td>
<td>Dec 2019</td>
<td>Mar 2021</td>
</tr>
<tr>
<td>Install Northwood Barrier</td>
<td>Sep 2019</td>
<td>Nov 2019</td>
</tr>
<tr>
<td>Install FeCl Barrier Redesign</td>
<td>Sep 2019</td>
<td>Nov 2019</td>
</tr>
<tr>
<td>Install barrier #2 (Tadpole Pond)</td>
<td>Feb 2021</td>
<td>May 2021</td>
</tr>
<tr>
<td>Install Barriers #3 (Location TBD)</td>
<td>Apr 2020</td>
<td>May 2021</td>
</tr>
<tr>
<td><strong>REDUCE: Carp Removals</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remove obstructions from seine areas</td>
<td>Oct 2020</td>
<td>Apr 2021</td>
</tr>
<tr>
<td>Spring Lake carp seines</td>
<td>Nov 2019</td>
<td>Apr 2021</td>
</tr>
<tr>
<td>Upper Prior Lake carp seines</td>
<td>Mar 2019</td>
<td>Apr 2021</td>
</tr>
<tr>
<td>Electrofishing removals</td>
<td>Apr 2020</td>
<td>Apr 2021</td>
</tr>
<tr>
<td>Micro-hauls</td>
<td>Apr 2020</td>
<td>Apr 2021</td>
</tr>
<tr>
<td>Gill Netting Pilot Project</td>
<td>Mar 2020</td>
<td>Nov 2021</td>
</tr>
<tr>
<td>Geis wetland carp removals</td>
<td>Apr 2019</td>
<td>Oct 2021</td>
</tr>
<tr>
<td>Pike Lake carp removals</td>
<td>Apr 2020</td>
<td>Oct 2021</td>
</tr>
<tr>
<td>Deploy Newman Trap in Arctic Lake outlet</td>
<td>Apr 2020</td>
<td>Jun 2021</td>
</tr>
<tr>
<td>Deploy Push Trap in desilting pond</td>
<td>Apr 2020</td>
<td>Jun 2021</td>
</tr>
<tr>
<td>Stock bluegills: Geis wetland, Northwood Pond, Tadpole</td>
<td>Apr 2020</td>
<td>May 2021</td>
</tr>
<tr>
<td>Stock bluegills &amp; Walleye in the two lakes</td>
<td>May 2020</td>
<td>May 2021</td>
</tr>
<tr>
<td>Box Trap removals with volunteers</td>
<td>Apr 2020</td>
<td>Sep 2021</td>
</tr>
<tr>
<td>Herding/training carp</td>
<td>Jan 2020</td>
<td>Jan 2020</td>
</tr>
<tr>
<td>Carp removals in other waterbodies (TBD)</td>
<td>Nov 2020</td>
<td>Dec 2021</td>
</tr>
</tbody>
</table>
PART 7 - SUMMARY

With the understanding that common carp play a role in the decline of water quality within the PLSLWD and with the knowledge that they are present, the goals and action items established in this plan will aid the PLSLWD in accomplishing its primary goal of managing and preserving the water resources across the watershed.

This plan is intended to be a living document; using adaptive management that may develop new management strategies and plan goals through data collection and analysis. As new data is collected and analyzed, current approaches, data collection efforts, and prioritization may change. The PLSLWD Carp IPM should be reviewed annually to provide updates to identified goals and action items and potentially add or modify goals as data collection may dictates. This plan incorporates an adaptive management approach. As data is collected and analyzed it will be used to inform the plan and possibly develop new objectives or approaches.

The PLSLWD Carp IPM has been developed as a guidance document for the management of common carp populations within the Prior Lake - Spring Lake Watershed District. The PLSLWD Carp IPM supports the goals of the 2011 Upper Prior and Spring lake TMDL and goals established for individual waterbodies throughout the watershed.
REFERENCES


Minnesota Pollution Control Agency (MPCA), (2020). Lower Minnesota River Watershed TMDL. Accessed online from: [https://www.pca.state.mn.us/water/watersheds/lower-minnesota-river](https://www.pca.state.mn.us/water/watersheds/lower-minnesota-river)


APPENDICES

Visit the following sites online to download the appendices documents:

APPENDIX A – 2018 CLEAN WATER PARTNERSHIP GRANT FINAL REPORT

APPENDIX B – ARCTIC LAKE FISHERIES ASSESSMENT 2017

APPENDIX C – CARP MANAGEMENT COST-BENEFIT SUMMARY 2020

APPENDIX D – CARP REMOVAL DATA 2016 – 2020

APPENDIX E – PIKE LAKE FISHERY ASSESSMENT 2020
BACKGROUND

The City of Prior Lake proposes to construct a new pickleball court, gravel parking lot, walkway and two associated stormwater basins on its property to the west of Spring Lake Regional Park near the intersection of Stemmer Ridge Road NW and CR-81 (Howard Lake Road NW).

Notice to Adjacent Landowners:
As the only landowners within 500 feet of the planned improvements are the City of Prior Lake and Scott County Parks Department, no notification to nearby residents was required. A written notice was sent to Scott County.

Note to Permit Applicant:
This report is not a permit. If the District Board approves the project, the applicant must then obtain a permit through the District staff.

Proposed Plan and Analysis:
The project was reviewed for compliance with PLSLWD’s Rules for Stormwater Management (Rule D) and Erosion & Sediment Control (Rule E). The attached memo provides further details on the review by the District Engineer including findings and recommendations.

The proposed project entails:
- 1.01 acres of total impervious surface
- 0.04 acre reduction of impervious surface compared to existing conditions
- 2.60 acres of total disturbance
DISCUSSION

Watershed District Board Decision:
The application was initially received on August 27, 2020 and determined to be complete. To meet the procedural requirements of Rule B and Minnesota Statutes Section 15.99 regarding time deadlines for Board action, the Board must make a decision to either:

1) approve or deny the permit application by October 26, 2020
   -or-
2) provide written notice to the applicant of an extension of the 60-day period and state the reasons for the extension and its anticipated length, which may not exceed 60 days unless approved by the applicant.

Options for Action:
1. Approve the application subject to the conditions noted herein.
2. Table the item until a future date specified and provide the applicant with direction on the issues that have been discussed.
3. Deny the application, stating the reasons for the denial.
4. Other specific actions as directed by the Board of Managers.

RECOMMENDATION

Staff Recommendation:
District staff recommends Option 1, that the project be approved subject to the application submitted, the supplemental information submitted by the applicant’s engineer, and with the conditions noted below.

Action Required:
A motion authorizing PLSLWD staff to issue a permit, subject to the following conditions:

1. All recommendations identified as conditional approval items in the attached permit review by the District Engineer be addressed to the satisfaction of the PLSLWD.
2. The permittee shall obtain all other required permits and approvals.
3. The permittee shall supply the District an as-built survey of the stormwater management BMPs within 35 days of project completion. The District shall review this survey as a part of the certificate of completion for the project.
4. The District will waive the requirement for a permit fee deposit.
5. A security deposit (surety) will be required from the contractor in the amount of $2,600 prior to the issuance of the permit.
6. The permittee is responsible for the stabilization and maintenance of the adjacent areas disturbed by the construction.
7. The permittee will provide contact information for the responsible erosion control contractor prior to initiating work.
Prior Lake Spring Lake Watershed District Permit Application Number 20.01

Applicant:  Pete Young
City of Prior Lake
952-447-9831
pyoung@cityofpriorlake.com

Agent:  Lani Leichty
Bolton & Menk, Inc.
952-890-0509
blanile@bolton-menk.com

Purpose:  Construction of a new pickleball court and parking lot.

Location:  Trailhead to Spring Lake Regional Park, off County Rd 82

District Rule:  C, D & E

Recommendation:  **Conditional approval** pending receipt of the following items:

**Stormwater Management**

1. Revised infiltration basin detail without rock trench extending to basin bottom, eliminating geotextile at surface, and adding specifying that knife valve should be closed under normal operation of the basins.

2. Specification of infiltration basin soil media - Typical basin cross-section calls for “Blended soil media per project specifications”.

3. Revised plan including knife valve detail.

4. Increased separation (>6”) between emergency overflow elevation and top of berm for infiltration basins.

5. Avoid use of fertilizer within infiltration basins - Fertilizer called out with straw blanket and seed mix 33-261 for infiltration basins.

6. Revised hydroCAD model addressing the following:
   a. Revise runoff routing to SBUH Weighting (calculating separate runoff for pervious and impervious areas).
   b. Update existing conditions curve number to brush, fair (56) instead of brush, poor (67) to be conservative on existing runoff rates.
   c. Consider using the Dynamic Storage-Indication or Storage-Indication methods for reach routing instead
of Simultaneous Routing. Simultaneous Routing is less stable than the above methods and best used for situations of reverse flow (not applicable for this project).

7. Revised stormwater management report addressing the following:
   a. Addition of Table 4.2 (curve numbers) - missing in original report.
   b. Updated high water levels for south basin in Table 4.4 - does not match hydroCAD output or design plans.
   c. Updated report tables after addressing all stormwater management comments.

Erosion and Sediment Control

8. Proof of application for NPDES permit.

Administrative

9. Letter from City indicating acceptance of maintenance responsibility for proposed stormwater management BMPs.

Conditions: 1. The permittee shall provide contact information for the responsible erosion and sediment control contractor prior to initiating work.

2. The permittee shall invite District permit inspector to preconstruction meeting.

3. The permittee shall obtain all other required permits and approvals.

4. The permittee is responsible for the stabilization and maintenance of the adjacent areas disturbed by the construction.

5. The permittee shall supply an as-built survey of stormwater management BMPs within 35 days of project completion. The District shall review this survey as a part of the certificate of completion for the project.


Findings:

1. Description – The project includes construction of a new pickleball facility, walkway, gravel parking lot and two infiltration basins near Spring Lake Regional Park (entrance of County Road 82). The total site area is 7.29 acres with 0.04 acres of existing impervious. The project will disturb 2.60 acres and result in 0.97 acres of new impervious, for a total of 1.01 acres of impervious surface.

2. Stormwater – Under existing conditions, stormwater runoff from the site discharges to both the north and the south. Discharge to the north is routed to an isolated wetland, while discharge to the south is routed to an existing 8” CMP culvert at the south edge of the site, eventually draining to Artic Lake. Soil borings suggest onsite soils are predominantly SC, CL and FILL (typically poor for infiltration).

   The proposed stormwater management plan includes two infiltration basins, one at the north end of the site and one at the south. Soil borings near the location of the proposed basins indicate they are excavated in FILL. Soil boring lot material descriptions of this FILL could suggest SM soils [HSG B] but without grainsize and hydrometer analysis this is only an assumption.

   These basins receive runoff from almost all impervious surfaces and have similar drainage areas to existing conditions. A small portion of the site entrance (0.05 acres impervious) cannot practicably be routed to either basin and discharges via overland flow the north wetland. These basins infiltrate all runoff from the site for the 2-year, 24-hour storm event satisfying District Rule D.3(c) and (f) [volume control and water quality treatment criteria]. Runoff leaving the site is reduced for the 2-, 10-, and 100-year, 24-hour storm events satisfying District Rule D.3(b) [rate control criteria]. The infiltration basins also include 4” underdrains to help drain the basins while vegetation is establishing and in the event the basins do not perform as expected allowing operation and performance as filtration basins.
Pretreatment to the infiltration basins is provided by a grass buffer from the pickleball courts (4’) and parking lot (2’).

Comments on the stormwater management plan will have to be addressed to confirm the project still meets District rules after necessary changes.

3. **Erosion & Sediment Control** – Both the SWPPP and an erosion control plan have been provided. The plan includes silt fence downstream of disturbed areas, a rock construction entrance, erosion control blanket, revegetation specifications and a construction sequencing notes.

4. **Floodplain** – There is no floodplain onsite.

5. **Buffer Strips** – There is one wetland north of the site, which is roughly 107 feet from the edge of project disturbance. This project does not trigger the District Rules for wetland alterations (Rule G) or buffer strips (Rule J).
## PRIOR LAKE - SPRING LAKE
WATERSHED DISTRICT

Prior Lake - Spring Lake Watershed District (PLSLWD)
4646 Dakota Street SE, Prior Lake, MN 55372, 952-447-4166

**PERMIT APPLICATION, PAGE 1 OF 2**

Note to Applicant: use this as the cover sheet for your application materials.

<table>
<thead>
<tr>
<th>PROJECT NAME</th>
<th>APPLICATION #: (to be assigned)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prior Lake Pickleball Facility</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name of Owner - Applicant</th>
<th>Phone #: 952-447-9800</th>
</tr>
</thead>
<tbody>
<tr>
<td>City of Prior Lake</td>
<td>Fax #: 952-447-4245</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Owner's Agent/Engineer:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
</tr>
<tr>
<td>Phone</td>
</tr>
<tr>
<td>E-mail</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Address of Owner - Applicant (Street, City, State, Zip Code)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4646 Dakota St. SE, Prior Lake, MN 55372</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Project Location (Township, Range, Section), PIDs, and Address</th>
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<tbody>
<tr>
<td>T114, R22, S4 - PID: 259040041</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Project size (acres)</th>
<th>2.6 acres</th>
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</thead>
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<table>
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<th>PERMIT CATEGORY (check applicable type(s))</th>
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<td>☒ Land Disturbance (C)</td>
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<td>☒ Stormwater Mgt (D)</td>
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<tr>
<td>☒ Erosion &amp; Sediment Ctrl (E)</td>
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<tr>
<td>☐ Drainage Alteration (I)</td>
</tr>
<tr>
<td>☐ Other:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PROJECT DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>This project involves the construction of a pickleball court and parking lot for the City of Prior Lake. The facility is located near Spring Lake Regional Park.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>GENERAL CONDITIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The Permittee grants to the District, and its agents, employees, officers and contractors, a license to enter the Project to perform any inspections or work authorized by the Permit or any applicable law. This license shall expire after acceptance of the work by the District and issuance of a Certificate of Completion.</td>
</tr>
<tr>
<td>2. The Permittee shall indemnify, defend and hold the District and its agents, employees and officers harmless for all claims made by itself and third parties for damages or loss sustained or costs incurred, including engineering and attorneys' fees, as a result of issuance of the Permit or construction of the Project.</td>
</tr>
<tr>
<td>3. The Permittee shall provide the District with a Permit Fee Deposit in accordance with District requirements (see page 2). The Permit Fee Deposit will be held in escrow and used by the District to pay the actual costs incurred by the District, including engineering and legal fees, to process and review the Permit Application, to inspect and monitor the activities authorized by the Permit, and to ensure compliance with the District's rules. The Permittee shall fully pay all bills submitted to it by the District within seven days of receipt. Bills not so paid shall accrue interest at the rate of 8% per year.</td>
</tr>
<tr>
<td>4. The Permittee shall obtain such easements as may be required for construction of the Project and provide in the final plat for the Project utility and drainage easements acceptable to the District to protect all hydrologic features within the Project and to provide access for the maintenance of the stormwater management facilities to be constructed pursuant to the Permit.</td>
</tr>
<tr>
<td>5. To assure full compliance with the terms of the Permit, the Permittee shall deposit with the District a cash security or irrevocable letter of credit in a form and from a surety satisfactory to the District, in the amount specified under the Special Conditions of the Permit, once issued.</td>
</tr>
<tr>
<td>6. By acceptance of the Permit, Permittee acknowledges and agrees to perform and be bound by all general and special terms and conditions of the Permit.</td>
</tr>
</tbody>
</table>

**CONTINUED ON NEXT PAGE**
PERMIT APPLICATION, PAGE 2 OF 2

Prior Lake - Spring Lake Watershed District (PLSLWD)
4646 Dakota Street SE, Prior Lake, MN 55372, 952-447-4166

PROJECT NAME
Prior Lake Pickleball Facility

APPLICATION #: (to be assigned)

Permit Fee Deposit - to be paid with your application:

Instructions: Calculate the required Permit Fee Deposit by totaling the amounts from items A through D below (as applicable). Include the Permit Fee Deposit with your application. Checks may be payable to the Prior Lake-Spring Lake Watershed District.

A) Grading or Alteration:
- less than one acre .................. $500
- 1.0 to 4.99 acres .................. $1,000
- 5.0 to 19.9 acres .................. $1,500
- 20 acres or more .................. $2,000

B) Projects with Wetland or Flood Plain Areas
- $1,000 + __________

C) Bridge or Culvert Crossing of a Waterbody or Ditch
- $1,500 per crossing + __________

D) Drainage Alterations
- $1,500 + __________

Total Permit Fee Deposit due with application = NA

Permit Fee Deposit information and conditions:
1. The Permit Fee Deposit will be held in escrow and used to pay the District's costs for reviewing the application and administering the permit (if approved), including staff costs, and engineering and legal fees.

2. If at any time the Permit Fee Deposit falls below 25% of the original amount, the District shall notify the applicant to replenish the fee deposit to the original amount.

3. Upon application approval, a separate permit security escrow shall be required from the applicant prior to permit issuance.

4. Upon final completion of the project and the issuance of a Certificate of Completion by the District, the District shall return any unspent balance in the Permit Fee Deposit to the applicant, less a $10 application fee. The District does not pay interest on escrow deposits.

I hereby apply under District Rule B for a permit to complete the proposed project in accordance with the information submitted with this Application and the District’s Rules, and I agree to the conditions on page one and two of this application.

Signature of Owner - Applicant: [Signature]
Your Name - please print: Pete Young
Date Submitted: 8/27/2020

Application Received: Permit Fee Deposit Amt: Received (y/n): District Representative:
Prior Lake Spring Lake Watershed District Permit Application Number 20.01

Applicant: Pete Young
City of Prior Lake
952-447-9831
pyoung@cityofpriorlake.com

Agent: Lani Leichty
Bolton & Menk, Inc.
952-890-0509
blanile@bolton-menk.com

Purpose: Construction of a new pickleball court and parking lot.

Location: Trailhead to Spring Lake Regional Park, off County Rd 82

District Rule: C, D & E

Recommendation: Conditional approval pending receipt of the following items:

Stormwater Management

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2. Specification of infiltration basin soil media - Typical basin cross-section calls for “Blended soil media per project specifications”.

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   3. The permittee shall obtain all other required permits and approvals.

   4. The permittee is responsible for the stabilization and maintenance of the adjacent areas disturbed by the construction.

   5. The permittee shall supply an as-built survey of stormwater management BMPs within 35 days of project completion. The District shall review this survey as a part of the certificate of completion for the project.

Findings:

1. Description – The project includes construction of a new pickleball facility, walkway, gravel parking lot and two infiltration basins near Spring Lake Regional Park (entrance of County Road 82). The total site area is 7.29 acres with 0.04 acres of existing impervious. The project will disturb 2.60 acres and result in 0.97 acres of new impervious, for a total of 1.01 acres of impervious surface.

2. Stormwater – Under existing conditions, stormwater runoff from the site discharges to both the north and the south. Discharge to the north is routed to an isolated wetland, while discharge to the south is routed to an existing 8” CMP culvert at the south edge of the site, eventually draining to Artic Lake. Soil borings suggest onsite soils are predominantly SC, CL and FILL (typically poor for infiltration).

The proposed stormwater management plan includes two infiltration basins, one at the north end of the site and one at the south. Soil borings near the location of the proposed basins indicate they are excavated in FILL. Soil boring lot material descriptions of this FILL could suggest SM soils [HSG B] but without grain size and hydrometer analysis this is only an assumption.

These basins receive runoff from almost all impervious surfaces and have similar drainage areas to existing conditions. A small portion of the site entrance (0.05 acres impervious) cannot practicably be routed to either basin and discharges via overland flow the north wetland. These basins infiltrate all runoff from the site for the 2-year, 24-hour storm event satisfying District Rule D.3(c) and (f) [volume control and water quality treatment criteria]. Runoff leaving the site is reduced for the 2-, 10-, and 100-year, 24-hour storm events satisfying District Rule D.3(b) [rate control criteria]. The infiltration basins also include 4” underdrains to help drain the basins while vegetation is establishing and in the event the basins do not perform as expected allowing operation and performance as filtration basins.
Pretreatment to the infiltration basins is provided by a grass buffer from the pickleball courts (4’) and parking lot (2’).

Comments on the stormwater management plan will have to be addressed to confirm the project still meets District rules after necessary changes.

3. **Erosion & Sediment Control** – Both the SWPPP and an erosion control plan have been provided. The plan includes silt fence downstream of disturbed areas, a rock construction entrance, erosion control blanket, revegetation specifications and a construction sequencing notes.

4. **Floodplain** – There is no floodplain onsite.

5. **Buffer Strips** – There is one wetland north of the site, which is roughly 107 feet from the edge of project disturbance. This project does not trigger the District Rules for wetland alterations (Rule G) or buffer strips (Rule J).
STORM WATER MANAGEMENT REPORT

PRIOR LAKE PICKLEBALL FACILITY

CITY OF PRIOR LAKE
Scott County, MN

T18. 122360

August 27, 2020
I hereby certify that this report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Lanol L. Leichty, P.E.

Date: August 27, 2020
License #: 20846

Bolton & Menk, Inc.
12224 Nicollet Avenue
Burnsville, MN 55337
(952) 890-0509
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Figures
Figure 1 – Project Site Location
Figure 2 – Existing Drainage Conditions
Figure 3 – Proposed Drainage Conditions

Appendices
Appendix A – Soils Map and Boring Information
Appendix B – HydroCAD Summaries (Pre- and Post-Development)
1.0 INTRODUCTION AND BACKGROUND

1.1 Project Background

The proposed Prior Lake Pickleball Facility is to be constructed on a 57.99 acre parcel, located in the Spring Lake Regional Park. The parcel is owned by the City of Prior Lake. This plan, prepared by Bolton & Menk, Inc. (BMI) is to document the basis of the storm water management design for the Prior Lake Pickleball Facility to meet the Prior Lake Spring Lake Watershed District storm water management requirements.

1.2 Data Used

The following data was used in this analysis:

- Aerial Imagery (MnGeo WMS Service, 2016 7-county)
- Existing Topography (Survey & MnTOPO, 2013)
- NOAA Atlas-14 Precipitation Data
2.0 **STORMWATER MANAGEMENT REQUIREMENTS**

2.1 **Prior Lake Spring Lake Watershed District**

The site is located within the Prior Lake Spring Lake Watershed District (PLSLWD). For City led projects the City of Prior Lake follows the PLSLWD standards. The stormwater standards used in the design of the resource management plan are:

- Runoff from development or redevelopment shall not exceed the existing 2-, 10-, and 100-year, 24-hour stormwater events.
- An on-site soils report shall be used to determine hydrologic soil groups.
- Retain the runoff volume generated on the site by the 2-year, 24-hour event under the developed condition for all points where discharges leave a site. For that portion of the 2-year, 24-hour event runoff volume that is not required to be infiltrated under paragraph, water quality BMPs or additional infiltration shall be incorporated.

**Minnesota Pollution Control Agency**

The Minnesota Pollution Control Agency (MPCA) regulates stormwater runoff by administering the National Pollution Discharge Elimination System (NPDES) Permit. The NPDES Permit is required for any projects that disturb more than one (1.0) acre of area. The permanent stormwater management requirements of the Permit are triggered if the project proposes to increase the impervious surface area by more than one acre.

The overall project disturbance is over one acre; therefore, a Stormwater Pollution Prevention Plan (SWPPP) was prepared and a NPDES Permit will be obtained through the MPCA. The proposed BMP(s) must be capable of retaining on site one (1) inch of runoff from the new impervious surfaces created by the project, which is less than that required by the Prior Lake Spring Lake Watershed District.
3.0 METHODOLOGY

3.1 Hydrology

The site was analyzed using HydroCAD for pre- and post-development conditions. Runoff generation was estimated using TR-20 methodology. NOAA Atlas 14 rainfall depths and nested distributions using MSE-3 rainfall distribution was used for the analysis. Runoff from pervious and impervious areas were calculated separately. Table 3.1 summarizes the rainfall depths that were used in the analysis.

<table>
<thead>
<tr>
<th>Rainfall Duration</th>
<th>2-Year</th>
<th>10-Year</th>
<th>100-Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 Hours</td>
<td>2.84</td>
<td>4.22</td>
<td>7.39</td>
</tr>
</tbody>
</table>

Time of concentration (TC) for existing conditions were calculated using the TR-55 methodology. Curve numbers were selected for each subwatershed based on the land use, soil conditions and impervious surface area. These parameters were used to select the appropriate CN using TR-55 methodology.

3.2 Hydraulics

Hydraulic routing within HydroCAD was computed using the Sim-Route methodology.
4.0 ANALYSIS AND RESULTS

4.1 Existing Conditions

4.1.1 Site Topography

Topography across the site is generally rolling with elevations between 995± and 977±. The site consists of a gravel parking lot and entrance road and a bituminous trail.

4.1.2 Soils

A soils report was prepared by American Engineering Testing, Inc. Soil boring #4 is located near the proposed southerly infiltration basin and soil boring #5 is located near the northerly infiltration basin. The soils report classifies the soils in soil boring #4 as mostly silty sand within the upper 4.5-feet. The soils in soil boring #5 were classified as silty sand, clayey sand, and a mixture of a little gravel within the upper 7-feet. These are considered to be Hydrologic Soil Group (HSG) Type B soils. A conservative infiltration rate of 0.3-in/hr was used for sizing the infiltration basins with a water quality pool depth of 12-inches. The soil information for the site is provided in Appendix A.

No groundwater was encountered in either Soil Boring #4 or #5.

4.1.3 Land Use

The existing land use consists of a gravel entrance road into the park and a mixture of brush/meadow in the area of the proposed improvements.

4.2 Proposed Conditions

4.2.1 Site Topography

The existing drainage patterns will try to be maintained as close as possible. The southern portion of the site will drain into a proposed infiltration basin, where the overflow will outlet through a culvert and drain to the south. The northern catchment will drain into an infiltration basin where it will be infiltrated and overflow through a culvert and drain to an isolated wetland.

4.2.2 Land Use

The site will be developed into a pickleball facility, with a gravel parking lot. Weighted CN values for each subwatershed were derived based on the following CN values provided in Table 4.2. The developed area within the lots was assumed to be open space with >75% grass cover.

The total disturbed area is approximately 5.9 acres (without offsite drainage areas), of which 0.97 acres is new impervious.

Figure 3 shows the proposed stormwater feature location and drainage areas.

4.3 Basin Summary and Routing

There will be two onsite infiltration basins for water quality purposes and rate control. Table 4.3 summarizes the performance of the basins and associated water levels.
Table 4.3 Basin HWL Summary

<table>
<thead>
<tr>
<th>Basin</th>
<th>100-Yr HWL (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Basin</td>
<td>988.6</td>
</tr>
<tr>
<td>South Basin</td>
<td>983.0</td>
</tr>
</tbody>
</table>

4.4 Rate Control

The development site was analyzed to determine the pre- and post-development runoff rates. The City standards require that the proposed runoff rates may not exceed existing rates for the 2-, 10-, and 100-year, 24-hours storms. The existing and proposed runoff rates are summarized in Table 4.4 See Appendix B for the pre- and post-development HydroCAD summaries.

Table 4.4 Summary of Site Peak Discharge Rates (cfs)

<table>
<thead>
<tr>
<th>North Runoff</th>
<th>2-Year</th>
<th>10-Year</th>
<th>100-Year</th>
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<tr>
<td></td>
<td>Rate (cfs)</td>
<td>Elevation-1P</td>
<td>Rate (cfs)</td>
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<tr>
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<td>0.4</td>
<td>NA</td>
<td>1.2</td>
</tr>
<tr>
<td>Proposed</td>
<td>0.2</td>
<td>987.8</td>
<td>0.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>South Basin</th>
<th>2-Year</th>
<th>10-Year</th>
<th>100-Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rate (cfs)</td>
<td>Elevation</td>
<td>Rate (cfs)</td>
</tr>
<tr>
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<td>0.6</td>
<td>NA</td>
<td>1.7</td>
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<tr>
<td>Proposed</td>
<td>0.0</td>
<td>982.83</td>
<td>0.2</td>
</tr>
</tbody>
</table>

4.5 Water Quality Calculations

The PLSLWD standards require permanent stormwater quality management be provided in accordance with the NPDES General Construction Permit No: MN R100001 (as amended). This involves providing a water quality runoff volume from a 2-year storm event over the developed condition. Pretreatment of runoff prior to discharging into the infiltration basins will be accomplished by the use of grass buffers and overland flow.

Table 4.5 Water Quality Volume Summary

<table>
<thead>
<tr>
<th>Pickleball Facility</th>
<th>2-year Runoff Volume (ac. ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>North Basin</td>
<td>0.088</td>
</tr>
<tr>
<td>South Basin</td>
<td>0.080</td>
</tr>
<tr>
<td>Total</td>
<td>0.168</td>
</tr>
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</table>

The infiltration basins have been designed to capture the entire 2-yr, 24-hr runoff volume with no discharge by using a raised culvert.
**Drawdown Time**

The soil borings in the area of the proposed infiltration basins show a silty sand soil type, which corresponds to a Hydrologic Soil Group (HSG) B soil with a Unified Soil Classification of SM. The Minnesota Stormwater Manual recommends using an infiltration rate of 0.3”/hr to 0.45”/hr for this soil type. A conservative infiltration rate of 0.3”/hr was used for each infiltration basin with a water quality volume depth of 3.5-inches for Infiltration Basin #1 and 9.8” for Infiltration Basin #2. The required water quality drawdown time for the filtration basins is 48 hours. Using this rate results in a drawdown time of 11.6 hours for Infiltration Basin #1 and 32.7 hours for Infiltration Basin #2.

A drain tile system has been added to each infiltration basin as a backup in case the soils become plugged with silt or do not perform as expected. This will allow the City to operate each basin as a filtration system.

Each basin has been sized for Phase 1 of this project. The timing of future Phase 2 is unknown at this time. When Phase 2 does occur the improvements will be sized to the Watershed District standards that are current at that time.
APPENDIX A

Soils Report
<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Surface Elevation</th>
<th>Material Description</th>
<th>GEOLOGY</th>
<th>N</th>
<th>M</th>
<th>Sample Type</th>
<th>REC</th>
<th>IN.</th>
<th>WC</th>
<th>DEN</th>
<th>LL</th>
<th>PL</th>
<th>%&lt;200</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>FILL, mostly silty sand, trace roots, brown</td>
<td>FILL</td>
<td>8</td>
<td>M</td>
<td>SS</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>CLAYEY SAND, a little gravel, brown, stiff (SC)</td>
<td>TILL</td>
<td>11</td>
<td>M</td>
<td>SS</td>
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<td></td>
<td></td>
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<td>3</td>
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<td></td>
<td>TILL</td>
<td>14</td>
<td>M</td>
<td>SS</td>
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END OF BORING

<table>
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<th>Drilling Method</th>
<th>Water Level Measurements</th>
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<tbody>
<tr>
<td>0-9½'</td>
<td>3.25&quot; HSA</td>
<td></td>
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</tbody>
</table>

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

Rig: 69C

Date: 03/2011

Prepared by: AMERICAN ENGINEERING TESTING, INC.

Page 89
**SUBSURFACE BORING LOG**

**AET No:** 20-22959  
**Project:** Sprint Lake Regional Park Improvements; Prior Lake, MN

<table>
<thead>
<tr>
<th>DEPTH IN FEET</th>
<th>MATERIAL DESCRIPTION</th>
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<th>N</th>
<th>MC</th>
<th>SAMPLE TYPE</th>
<th>REC IN.</th>
<th>FIELD &amp; LABORATORY TESTS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FILL, mostly clayey sand, trace roots, brown</td>
<td>FILL</td>
<td>6</td>
<td>M</td>
<td>SS</td>
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<td>17</td>
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<td>M</td>
<td>SS</td>
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</tr>
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<td>SS</td>
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<tr>
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<td>18</td>
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**END OF BORING**

**DEPTH:** DRILLING METHOD  
**WATER LEVEL MEASUREMENTS**

<table>
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<th>DRILLING METHOD</th>
<th>WATER LEVEL MEASUREMENTS</th>
<th>NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG</th>
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</thead>
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<td>0-9½'</td>
<td>3.25&quot; HSA</td>
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</tbody>
</table>

**WEB: BORING COMPLETED:** 8/5/20  
**DR:** TA  
**LG:** JJ  
**Rig:** 69C

03/2011
### Subsurface Boring Log

**AET No:** 20-22959  
**Project:** Sprint Lake Regional Park Improvements; Prior Lake, MN

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<th>GEOLOGY</th>
<th>N</th>
<th>MC</th>
<th>Sample Type</th>
<th>REC IN.</th>
<th>Field &amp; Laboratory Tests</th>
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</thead>
<tbody>
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<td>FILL</td>
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<td>M</td>
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<td>16</td>
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<tr>
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<td>SANDY LEAN CLAY, trace roots, brown, firm (CL)</td>
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<td>7</td>
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**End of Boring**

**Depth:** 3.25" HSA

**Drilling Method:** 3.25" HSA

**Water Level Measurements:**

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<th>Time</th>
<th>Sampled Depth</th>
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<th>Cave-in Depth</th>
<th>Drilling Fluid Level</th>
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**Note:** Refer to the attached sheets for an explanation of terminology on this log.

**Boring Completed:** 8/5/20

**Dr:** TA  **LG:** JJ  **Rig:** 69C

03/2011
## SUBSURFACE BORING LOG

**AET No:** 20-22959  
**Log of Boring No.:** 4 (p. 1 of 1)  
**Project:** Sprint Lake Regional Park Improvements; Prior Lake, MN

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<th>SAMPLE TYPE</th>
<th>REC. IN.</th>
<th>FIELD &amp; LABORATORY TESTS</th>
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</thead>
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<tr>
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<td>SS</td>
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<td>WC</td>
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<td>SS</td>
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<td>WC</td>
</tr>
<tr>
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<td></td>
<td>CLAYEY SAND, a little gravel, light brown, stiff (SC)</td>
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<td>SS</td>
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<td>17</td>
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<tr>
<td>4</td>
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<td>SS</td>
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<td>SS</td>
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<td>21</td>
</tr>
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<td>6</td>
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</tbody>
</table>

### MATERIAL DESCRIPTION
- **FILL, mostly silty sand, trace roots, brown**
- **CLAYEY SAND, a little gravel, light brown, stiff (SC)**

### DEPTH: DRILLING METHOD
- **0-9½' 3.25" HSA**

### WATER LEVEL MEASUREMENTS

**DATE:** 8/5/20  
**TIME:**

### NOTE:
Refer to the attached sheets for an explanation of terminology on this log.

**BORING COMPLETED:** 8/5/20  
**DR:** TA  
**LG:** JJ  
**Rig:** 69C  

03/2011
### SUBSURFACE BORING LOG

#### AET No: 20-22959  
**Log of Boring No.** 5 (p. 1 of 1)

**Project:** Sprint Lake Regional Park Improvements; Prior Lake, MN

<table>
<thead>
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<th>Surface Elevation</th>
<th>Material Description</th>
<th>Geology</th>
<th>N</th>
<th>MC</th>
<th>Sample Type</th>
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<th>Field &amp; Laboratory Tests</th>
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<td>982.8</td>
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<td>M</td>
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<td>2</td>
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<td>FILL, mixture of clayey sand and silty sand, a little gravel, brown</td>
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<td>11</td>
<td>M</td>
<td>SS</td>
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<td>15</td>
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<tr>
<td>3</td>
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<td></td>
<td>12</td>
<td>M</td>
<td>SS</td>
<td>15</td>
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<td>7</td>
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<td>CLAYEY SAND, a little gravel, brown to gray, stiff to very stiff (SC)</td>
<td>TILL</td>
<td>14</td>
<td>M</td>
<td>SS</td>
<td>20</td>
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<td>29</td>
<td>M</td>
<td>SS</td>
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#### Field & Laboratory Tests

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<th>Field &amp; Laboratory Tests</th>
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#### Water Level Measurements

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<th>Date</th>
<th>Time</th>
<th>Sampled Depth</th>
<th>Casing Depth</th>
<th>Cave-in Depth</th>
<th>Drilling Fluid Level</th>
<th>Water Level</th>
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<td>3.25&quot; HSA</td>
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#### Note: Refer to the attached sheets for an explanation of terminology on this log.

**Rig:** 69C

**Sampled Depth:** 3.25" HSA

**Casing Depth:** 0-12½'

**DR:** TA  
**LG:** JJ  
**Rig:** 69C  

**Surface Elevation:** 982.8

**Date:** 8/5/20

**DRILLING METHOD:** 3.25" HSA

**DRILLING COMPLETED:** 8/5/20

**DR:** TA  
**LG:** JJ  
**Rig:** 69C  

**03/2011**
APPENDIX B

HydroCAD Summaries
(Pre- and Post-Development)
Summary for Subcatchment 1S: North Area

Runoff = 0.43 cfs @ 12.37 hrs, Volume = 0.038 af, Depth > 0.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span = 5.00-20.00 hrs, dt = 0.05 hrs
MSE 24-hr 3 2-Yr Rainfall = 2.84"

<table>
<thead>
<tr>
<th>Area (sf)</th>
<th>CN</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>37,364</td>
<td>67</td>
<td>Brush, Poor, HSG B</td>
</tr>
<tr>
<td>1,567</td>
<td>96</td>
<td>Gravel Road</td>
</tr>
<tr>
<td>38,931</td>
<td>68</td>
<td>Weighted Average</td>
</tr>
<tr>
<td>38,931</td>
<td>100.00% Pervious Area</td>
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</table>

<table>
<thead>
<tr>
<th>Tc (min)</th>
<th>Length (feet)</th>
<th>Slope (ft/ft)</th>
<th>Velocity (ft/sec)</th>
<th>Capacity (cfs)</th>
<th>Description</th>
</tr>
</thead>
</table>
| 21.7     | 176           | 0.0250        | 0.13              |                | Sheet Flow, Grass: Dense n = 0.240 P2 = 2.85"

Summary for Subcatchment 2S: South Area

Runoff = 0.56 cfs @ 12.51 hrs, Volume = 0.060 af, Depth > 0.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span = 5.00-20.00 hrs, dt = 0.05 hrs
MSE 24-hr 3 2-Yr Rainfall = 2.84"

<table>
<thead>
<tr>
<th>Area (sf)</th>
<th>CN</th>
<th>Description</th>
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<tbody>
<tr>
<td>67,634</td>
<td>67</td>
<td>Brush, Poor, HSG B</td>
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<tr>
<td>67,634</td>
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<td>100.00% Pervious Area</td>
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<table>
<thead>
<tr>
<th>Tc (min)</th>
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<th>Slope (ft/ft)</th>
<th>Velocity (ft/sec)</th>
<th>Capacity (cfs)</th>
<th>Description</th>
</tr>
</thead>
</table>
| 29.8     | 300           | 0.0330        | 0.17              |                | Sheet Flow, Grass: Dense n = 0.240 P2 = 2.85"
Summary for Subcatchment 1S: North Area

Runoff = 1.22 cfs @ 12.34 hrs, Volume= 0.094 af, Depth> 1.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Yr Rainfall=4.22"

<table>
<thead>
<tr>
<th>Area (sf)</th>
<th>CN</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>37,364</td>
<td>67</td>
<td>Brush, Poor, HSG B</td>
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<tr>
<td>* 1,567</td>
<td>96</td>
<td>Gravel Road</td>
</tr>
<tr>
<td>38,931</td>
<td>68</td>
<td>Weighted Average</td>
</tr>
<tr>
<td>38,931</td>
<td>100.00% Pervious Area</td>
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Tc Length Slope Velocity Capacity Description
(min) (feet) (ft/ft) (ft/sec) (cfs)  
21.7 176 0.0250 0.13 **Sheet Flow,**  
Grass: Dense  n= 0.240  P2= 2.85"

Summary for Subcatchment 2S: South Area

Runoff = 1.67 cfs @ 12.46 hrs, Volume= 0.155 af, Depth> 1.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10-Yr Rainfall=4.22"

<table>
<thead>
<tr>
<th>Area (sf)</th>
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<td>67,634</td>
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<td>100.00% Pervious Area</td>
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Tc Length Slope Velocity Capacity Description
(min) (feet) (ft/ft) (ft/sec) (cfs)  
29.8 300 0.0330 0.17 **Sheet Flow,**  
Grass: Dense  n= 0.240  P2= 2.85"
Summary for Subcatchment 1S: North Area

Runoff = 3.57 cfs @ 12.32 hrs, Volume= 0.264 af, Depth> 3.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Yr Rainfall=7.39"

<table>
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<th>Area (sf)</th>
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<th>Description</th>
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<tbody>
<tr>
<td>37,364</td>
<td>67</td>
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<td>1,567</td>
<td>96</td>
<td>Gravel Road</td>
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<table>
<thead>
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<th>Tc</th>
<th>Length</th>
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<th>Velocity</th>
<th>Capacity</th>
<th>Description</th>
</tr>
</thead>
</table>
| 21.7 | 176    | 0.0250 | 0.13     |          | Sheet Flow, Grass: Dense n= 0.240 P2= 2.85"

Summary for Subcatchment 2S: South Area

Runoff = 5.02 cfs @ 12.43 hrs, Volume= 0.445 af, Depth> 3.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100-Yr Rainfall=7.39"

<table>
<thead>
<tr>
<th>Area (sf)</th>
<th>CN</th>
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<tbody>
<tr>
<td>67,634</td>
<td>67</td>
<td>Brush, Poor, HSG B</td>
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<tr>
<td>67,634</td>
<td>100.00% Pervious Area</td>
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<table>
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<th>Slope</th>
<th>Velocity</th>
<th>Capacity</th>
<th>Description</th>
</tr>
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</table>
| 29.8 | 300    | 0.0330 | 0.17     |          | Sheet Flow, Grass: Dense n= 0.240 P2= 2.85"
Summary for Subcatchment 1S: North

Runoff = 1.68 cfs @ 12.19 hrs, Volume= 0.088 af, Depth> 0.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2 yr Rainfall=2.85"

<table>
<thead>
<tr>
<th>Area (sf)</th>
<th>CN</th>
<th>Description</th>
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<tbody>
<tr>
<td>21,898</td>
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<td>Unconnected pavement, HSG C</td>
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<tr>
<td>25,816</td>
<td>61</td>
<td>Pasture/grassland/range, Good, HSG B</td>
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<tr>
<td>47,714</td>
<td>78</td>
<td>Weighted Average</td>
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<tr>
<td>25,816</td>
<td>54.11% Pervious Area</td>
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<tr>
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<td>45.89% Impervious Area</td>
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<td>Direct Entry,</td>
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Summary for Subcatchment 2S: South

Runoff = 1.52 cfs @ 12.18 hrs, Volume= 0.080 af, Depth> 0.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2 yr Rainfall=2.85"

<table>
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<th>Area (sf)</th>
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<td>Pasture/grassland/range, Good, HSG B</td>
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<td>54,600</td>
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<td>Weighted Average</td>
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<tr>
<td>35,682</td>
<td>65.35% Pervious Area</td>
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<tr>
<td>18,918</td>
<td>34.65% Impervious Area</td>
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</tr>
<tr>
<td>18,918</td>
<td>100.00% Unconnected</td>
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<table>
<thead>
<tr>
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<th>Slope</th>
<th>Velocity</th>
<th>Capacity</th>
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<tr>
<td>6.9</td>
<td>41</td>
<td>0.0240</td>
<td>0.10</td>
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<td>Sheet Flow, Grass: Dense n= 0.240 P2= 2.84&quot;</td>
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<td>2.2</td>
<td>175</td>
<td>0.0370</td>
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<td>Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps</td>
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<tr>
<td>9.1</td>
<td>216</td>
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<td></td>
<td></td>
<td>Total</td>
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</table>

Summary for Subcatchment 3S: East

Runoff = 0.23 cfs @ 12.12 hrs, Volume= 0.010 af, Depth> 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 2 yr Rainfall=2.85"
Summary of Pond 1P: North Basin

**Inflow Area** = 1.095 ac, 45.89% Impervious, Inflow Depth > 0.97" for 2 yr event

**Inflow** = 1.68 cfs @ 12.19 hrs, Volume = 0.088 af

**Outflow** = 0.06 cfs @ 15.13 hrs, Volume = 0.043 af, Atten = 96%, Lag = 176.4 min

**Discarded** = 0.06 cfs @ 15.13 hrs, Volume = 0.043 af

**Primary** = 0.00 cfs @ 5.00 hrs, Volume = 0.000 af

Routing by Sim-Route method, Time Span = 5.00-20.00 hrs, dt = 0.05 hrs

Peak Elev = 987.79' @ 15.13 hrs Surf.Area = 8,790 sf Storage = 2,499 cf

Plug-Flow detention time = (not calculated: outflow precedes inflow)

Center-of-Mass det. time = 142.2 min (942.8 - 800.6)

**Volume Invert Avail.Storage Storage Description**

| #1 | 987.50' | 19,950 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc) |

**Elevation** (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet)
---|---|---|---
987.50 | 8,272 | 0 | 0
988.00 | 9,156 | 4,357 | 4,357
989.00 | 11,001 | 10,079 | 14,436
989.50 | 11,056 | 5,514 | 19,950

**Device Routing Invert Outlet Devices**

| #1 | Discarded | 987.50' | 0.300 in/hr Exfiltration over Surface area
| #2 | Primary | 988.00' | **12.0" Round Culvert**
|     |         |         | L = 20.0' CPP, mitered to conform to fill, Ke = 0.700
|     |         |         | Inlet / Outlet Invert = 988.00' / 987.00' S = 0.0500 '/' Cc = 0.900
|     |         |         | n = 0.013, Flow Area = 0.79 sf
| #3 | Primary | 988.65' | **4.0' long x 4.0' breadth Broad-Crested Rectangular Weir**
|     |         |         | Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00
|     |         |         | 2.50 3.00 3.50 4.00 4.50 5.00 5.50 6.00
|     |         |         | Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66
|     |         |         | 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32
Discarded OutFlow Max=0.06 cfs @ 15.13 hrs HW=987.79’ (Free Discharge)

1=Exfiltration (Exfiltration Controls 0.06 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=987.50’ TW=0.00’ (Dynamic Tailwater)

2=Culvert (Controls 0.00 cfs)
3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 2P: South Basin

Inflow Area = 1.253 ac, 34.65% Impervious, Inflow Depth > 0.77” for 2 yr event
Inflow = 1.52 cfs @ 12.18 hrs, Volume= 0.080 af
Outflow = 0.03 cfs @ 19.49 hrs, Volume= 0.017 af, Atten= 98%, Lag= 439.0 min
Discarded = 0.03 cfs @ 19.49 hrs, Volume= 0.017 af
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Sim-Route method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 981.82’ @ 19.49 hrs Surf.Area= 3,683 sf Storage= 2,745 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 146.6 min (954.5 - 807.9)

Volume Invert Avail.Storage Storage Description
#1 981.00’ 10,232 cf Custom Stage Data (Prismatic) listed below (Recalc)

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<td>0</td>
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<tr>
<td>982.00</td>
<td>3,832</td>
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<td>3,409</td>
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<tr>
<td>983.50</td>
<td>5,290</td>
<td>2,517</td>
<td>10,232</td>
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</table>

Device Routing Invert Outlet Devices
#1 Discarded 981.00’ 0.300 in/hr Exfiltration over Surface area
#2 Primary 981.85’ 15.0” Round Culvert
L= 20.0’ CPP, mitered to conform to fill, Ke= 0.700
Inlet / Outlet Invert= 981.85’ / 981.00’ S= 0.0425’” Cc= 0.900
n= 0.013, Flow Area= 1.23 sf

#3 Primary 983.10’ 4.0’ long x 4.0’ breadth Broad-Crested Rectangular Weir
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00
2.50 3.00 3.50 4.00 4.50 5.00 5.50
Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.66 2.66 2.66
2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=0.03 cfs @ 19.49 hrs HW=981.82’ (Free Discharge)

1=Exfiltration (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=981.00’ (Free Discharge)

2=Culvert (Controls 0.00 cfs)
3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
Summary for Link 1L: Total

Inflow Area = 1.183 ac, 46.91% Impervious, Inflow Depth > 0.10" for 2 yr event
Inflow = 0.23 cfs @ 12.12 hrs, Volume= 0.010 af
Primary = 0.23 cfs @ 12.17 hrs, Volume= 0.010 af, Atten= 0%, Lag= 3.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Summary for Subcatchment 1S: North

Runoff = 3.45 cfs @ 12.18 hrs, Volume= 0.181 af, Depth> 1.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10 yr Rainfall=4.23"

<table>
<thead>
<tr>
<th>Area (sf)</th>
<th>CN</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>21,898</td>
<td>98</td>
<td>Unconnected pavement, HSG C</td>
</tr>
<tr>
<td>25,816</td>
<td>61</td>
<td>Pasture/grassland/range, Good, HSG B</td>
</tr>
</tbody>
</table>

| 47,714   | 78  | Weighted Average             |
| 25,816   |     | 54.11% Pervious Area         |
| 21,898   |     | 45.89% Impervious Area       |
| 21,898   |     | 100.00% Unconnected          |

<table>
<thead>
<tr>
<th>Tc (min)</th>
<th>Length (feet)</th>
<th>Slope (ft/ft)</th>
<th>Velocity (ft/sec)</th>
<th>Capacity (cfs)</th>
<th>Description</th>
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</thead>
<tbody>
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<td>10.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Direct Entry,</td>
</tr>
</tbody>
</table>

Summary for Subcatchment 2S: South

Runoff = 3.48 cfs @ 12.17 hrs, Volume= 0.176 af, Depth> 1.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10 yr Rainfall=4.23"

<table>
<thead>
<tr>
<th>Area (sf)</th>
<th>CN</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>18,918</td>
<td>98</td>
<td>Unconnected roofs, HSG C</td>
</tr>
<tr>
<td>35,682</td>
<td>61</td>
<td>Pasture/grassland/range, Good, HSG B</td>
</tr>
</tbody>
</table>

| 54,600   | 74  | Weighted Average             |
| 35,682   |     | 65.35% Pervious Area         |
| 18,918   |     | 34.65% Impervious Area       |
| 18,918   |     | 100.00% Unconnected          |

<table>
<thead>
<tr>
<th>Tc (min)</th>
<th>Length (feet)</th>
<th>Slope (ft/ft)</th>
<th>Velocity (ft/sec)</th>
<th>Capacity (cfs)</th>
<th>Description</th>
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<tbody>
<tr>
<td>6.9</td>
<td>41</td>
<td>0.0240</td>
<td>0.10</td>
<td></td>
<td>Sheet Flow, Grass: Dense n= 0.240 P2= 2.84&quot;</td>
</tr>
<tr>
<td>2.2</td>
<td>175</td>
<td>0.0370</td>
<td>1.35</td>
<td></td>
<td>Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps</td>
</tr>
<tr>
<td>9.1</td>
<td>216</td>
<td></td>
<td></td>
<td></td>
<td>Total</td>
</tr>
</tbody>
</table>

Summary for Subcatchment 3S: East

Runoff = 0.42 cfs @ 12.12 hrs, Volume= 0.019 af, Depth> 2.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 10 yr Rainfall=4.23"
Proposed Pickleball Ct

MSE 24-hr 3  10 yr Rainfall=4.23"

Prepared by Bolton & Menk Inc

Printed 8/26/2020

Summary for Pond 1P: North Basin

Inflow Area = 1.095 ac, 45.89% Impervious, Inflow Depth > 1.98" for 10 yr event
Inflow = 3.45 cfs @ 12.18 hrs, Volume= 0.180 af
Outflow = 0.12 cfs @ 14.90 hrs, Volume= 0.071 af, Atten= 96%, Lag= 163.2 min
Discarded = 0.07 cfs @ 14.90 hrs, Volume= 0.050 af
Primary = 0.06 cfs @ 14.90 hrs, Volume= 0.021 af

Routing by Sim-Route method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 988.12' @ 14.90 hrs Surf.Area= 9,379 sf Storage= 5,480 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 136.8 min ( 925.7 - 788.9 )

Volume Invert Avail.Storage Storage Description
#1 987.50' 19,950 cf Custom Stage Data (Prismatic). Listed below (Recalc)

Elevation Surf.Area Inc.Store Cum.Store
(feet) (sq-ft) (cubic-feet) (cubic-feet)
987.50 8,272 0 0
988.00 9,156 4,357 4,357
989.00 11,001 10,079 14,436
989.50 11,056 5,514 19,950

Device Routing Invert Outlet Devices
#1 Discarded 987.50' 0.300 in/hr Exfiltration over Surface area
#2 Primary 988.00' 12.0" Round Culvert
L= 20.0' CPP, mitered to conform to fill, Ke= 0.700
Inlet / Outlet Invert= 988.00' / 987.00' S= 0.0500 '/' Cc= 0.900
n= 0.013, Flow Area= 0.79 sf

#3 Primary 988.65' 4.0' long x 4.0' breadth Broad-Crested Rectangular Weir
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00
2.50 3.00 3.50 4.00 4.50 5.00 5.50
Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66
2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32
Discarded OutFlow  Max=0.07 cfs @ 14.90 hrs  HW=988.12’ (Free Discharge)  
1=Exfiltration (Exfiltration Controls 0.07 cfs)

Primary OutFlow  Max=0.06 cfs @ 14.90 hrs  HW=988.12’  TW=0.00’ (Dynamic Tailwater)  
2=Culvert (Inlet Controls 0.06 cfs @ 1.05 fps)  
3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 2P: South Basin

Inflow Area = 1.253 ac, 34.65% Impervious, Inflow Depth > 1.68” for 10 yr event
Inflow = 3.48 cfs @ 12.17 hrs, Volume= 0.175 af
Outflow = 0.50 cfs @ 12.71 hrs, Volume= 0.104 af, Atten= 86%, Lag= 32.3 min
Discarded = 0.03 cfs @ 12.71 hrs, Volume= 0.020 af
Primary = 0.47 cfs @ 12.71 hrs, Volume= 0.084 af

Routing by Sim-Route method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 982.19’ @ 12.71 hrs  Surf.Area= 4,011 sf  Storage= 4,149 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 80.4 min ( 874.8 - 794.4 )

<table>
<thead>
<tr>
<th>Volume</th>
<th>Invert</th>
<th>Avail.Storage</th>
<th>Storage Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>981.00’</td>
<td>10,232 cf</td>
<td>Custom Stage Data (Prismatic) listed below (Recalc)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>981.00</td>
<td>2,986</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>982.00</td>
<td>3,832</td>
<td>3,409</td>
<td>3,409</td>
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<td>983.00</td>
<td>4,779</td>
<td>4,306</td>
<td>7,715</td>
</tr>
<tr>
<td>983.50</td>
<td>5,290</td>
<td>2,517</td>
<td>10,232</td>
</tr>
</tbody>
</table>

Device Routing Invert Outlet Devices

#1 Discarded 981.00’ 0.300 in/hr Exfiltration over Surface area

15.0” Round Culvert
L= 20.0’  CPP, mitered to conform to fill, Ke= 0.700
Inlet / Outlet Invert= 981.85’ / 981.00’  S= 0.0425’  Cc= 0.900
n= 0.013, Flow Area= 1.23 sf

#2 Primary 981.85’
4.0’ long x 4.0’ breadth Broad-Crested Rectangular Weir
Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50
Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow  Max=0.03 cfs @ 12.71 hrs  HW=982.19’ (Free Discharge)  
1=Exfiltration (Exfiltration Controls 0.03 cfs)

Primary OutFlow  Max=0.47 cfs @ 12.71 hrs  HW=982.19’ (Free Discharge)  
2=Culvert (Inlet Controls 0.47 cfs @ 1.75 fps)  
3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
Summary for Link 1L: Total

Inflow Area = 1.183 ac, 46.91% Impervious, Inflow Depth > 0.40" for 10 yr event
Inflow = 0.42 cfs @ 12.12 hrs, Volume= 0.040 af
Primary = 0.42 cfs @ 12.17 hrs, Volume= 0.040 af, Atten= 0%, Lag= 3.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Summary for Subcatchment 1S: North

Runoff = 7.91 cfs @ 12.17 hrs, Volume= 0.423 af, Depth> 4.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100 yr Rainfall=7.38"

<table>
<thead>
<tr>
<th>Area (sf)</th>
<th>CN</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>21,898</td>
<td>98</td>
<td>Unconnected pavement, HSG C</td>
</tr>
<tr>
<td>25,816</td>
<td>61</td>
<td>Pasture/grassland/range, Good, HSG B</td>
</tr>
</tbody>
</table>

| 47,714    | 78  | Weighted Average                 |
| 25,816    |     | 54.11% Pervious Area             |
| 21,898    |     | 45.89% Impervious Area           |
| 21,898    |     | 100.00% Unconnected              |

Tc  Length  Slope  Velocity  Capacity  Description
(min)  (feet) (ft/ft) (ft/sec) (cfs)
10.0   

Direct Entry,

Summary for Subcatchment 2S: South

Runoff = 8.61 cfs @ 12.16 hrs, Volume= 0.438 af, Depth> 4.20"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100 yr Rainfall=7.38"

<table>
<thead>
<tr>
<th>Area (sf)</th>
<th>CN</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>18,918</td>
<td>98</td>
<td>Unconnected roofs, HSG C</td>
</tr>
<tr>
<td>35,682</td>
<td>61</td>
<td>Pasture/grassland/range, Good, HSG B</td>
</tr>
</tbody>
</table>

| 54,600    | 74  | Weighted Average                 |
| 35,682    |     | 65.35% Pervious Area             |
| 18,918    |     | 34.65% Impervious Area           |
| 18,918    |     | 100.00% Unconnected              |

Tc  Length  Slope  Velocity  Capacity  Description
(min)  (feet) (ft/ft) (ft/sec) (cfs)

6.9   41  0.0240  0.10  Sheet Flow,
| 2.2   175  0.0370  1.35  Shallow Concentrated Flow,

9.1   216  Total

Summary for Subcatchment 3S: East

Runoff = 0.85 cfs @ 12.11 hrs, Volume= 0.040 af, Depth> 5.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
MSE 24-hr 3 100 yr Rainfall=7.38"
### Proposed Pickleball Ct

**MSE 24-hr 3 100 yr Rainfall=7.38”**

Prepared by Bolton & Menk Inc

Printed 8/26/2020

HydroCAD® 10.00-24  s/n 01030 © 2018 HydroCAD Software Solutions LLC

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#### Hydrology Table

<table>
<thead>
<tr>
<th>Area (sf)</th>
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<th>Description</th>
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<td>Unconnected pavement, HSG C</td>
</tr>
<tr>
<td>1,545</td>
<td>65</td>
<td>Brush, Good, HSG C</td>
</tr>
<tr>
<td>3,825</td>
<td>85</td>
<td>Weighted Average</td>
</tr>
<tr>
<td>1,545</td>
<td>40.39%</td>
<td>Pervious Area</td>
</tr>
<tr>
<td>2,280</td>
<td>59.61%</td>
<td>Impervious Area</td>
</tr>
<tr>
<td>2,280</td>
<td>100.00%</td>
<td>Unconnected</td>
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</table>

#### Summary of Tc Values

<table>
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<tr>
<th>Tc (min)</th>
<th>Length (feet)</th>
<th>Slope (ft/ft)</th>
<th>Velocity (ft/sec)</th>
<th>Capacity (cfs)</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>4.4</td>
<td>34</td>
<td>0.0500</td>
<td>0.13</td>
<td></td>
<td><strong>Sheet Flow,</strong> Grass: Dense</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>n= 0.240  P2= 2.84”</td>
</tr>
<tr>
<td>0.7</td>
<td>21</td>
<td>0.0050</td>
<td>0.49</td>
<td></td>
<td><strong>Shallow Concentrated Flow,</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Short Grass Pasture  Kv= 7.0 fps</td>
</tr>
</tbody>
</table>

#### Summary for Pond 1P: North Basin

Inflow Area = 1.095 ac, 45.89% Impervious, Inflow Depth > 4.63” for 100 yr event

Inflow = 7.91 cfs @ 12.17 hrs, Volume= 0.423 af

Outflow = 1.27 cfs @ 12.64 hrs, Volume= 0.061 af

Discarded = 0.07 cfs @ 12.64 hrs, Volume= 0.238 af

Routing by Sim-Route method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Peak Elev= 988.62’ @ 12.64 hrs  Surf.Area= 10,293 sf  Storage= 10,348 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= 82.7 min (857.7 - 775.0 )

**Custom Stage Data (Prismatic) Listed below (Recalc)**

<table>
<thead>
<tr>
<th>Volume #1</th>
<th>Invert</th>
<th>Avail.Storage</th>
<th>Storage Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>987.50’</td>
<td>19,950 cf</td>
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<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>987.50</td>
<td>8,272</td>
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<tr>
<td>988.00</td>
<td>9,156</td>
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<td>4,357</td>
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<tr>
<td>989.00</td>
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<td>989.50</td>
<td>11,056</td>
<td>5,514</td>
<td>19,950</td>
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<table>
<thead>
<tr>
<th>Device #1 Routing</th>
<th>Invert</th>
<th>Outlet Devices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discarded</td>
<td>987.50’</td>
<td><strong>0.300 in/hr Exfiltration over Surface area</strong></td>
</tr>
<tr>
<td>#2 Primary</td>
<td>988.00’</td>
<td><strong>12.0” Round Culvert</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>L= 20.0’ CPP, mitered to conform to fill, Ke= 0.700</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inlet / Outlet Invert= 988.00’ / 987.00’</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S= 0.0500 ’/’  Cc= 0.900</td>
</tr>
<tr>
<td></td>
<td></td>
<td>n= 0.013, Flow Area= 0.79 sf</td>
</tr>
<tr>
<td>#3 Primary</td>
<td>988.65’</td>
<td><strong>4.0’ long x 4.0’ breadth Broad-Crested Rectangular Weir</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.50 3.00 3.50 4.00 4.50 5.00 5.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32</td>
</tr>
</tbody>
</table>
**Summary for Pond 2P: South Basin**

Inflow Area = 1.253 ac, 34.65% Impervious, Inflow Depth > 4.19" for 100 yr event

<table>
<thead>
<tr>
<th>Inflow</th>
<th>8.61 cfs @ 12.16 hrs, Volume= 0.438 af</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outflow</td>
<td>3.99 cfs @ 12.34 hrs, Volume= 0.362 af, Atten= 54%, Lag= 10.8 min</td>
</tr>
<tr>
<td>Discarded</td>
<td>0.03 cfs @ 12.34 hrs, Volume= 0.024 af</td>
</tr>
<tr>
<td>Primary</td>
<td>3.96 cfs @ 12.34 hrs, Volume= 0.339 af</td>
</tr>
</tbody>
</table>

Routing by Sim-Route method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Peak Elev= 983.04' @ 12.34 hrs Surf.Area= 4,821 sf Storage= 7,913 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 37.7 min (817.2 - 779.5)

<table>
<thead>
<tr>
<th>Volume</th>
<th>Invert</th>
<th>Avail.Storage</th>
<th>Storage Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>981.00'</td>
<td>10,232 cf</td>
<td>Custom Stage Data (Prismatic) Listed below (Recalc)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>981.00</td>
<td>2,986</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>982.00</td>
<td>3,832</td>
<td>3,409</td>
<td>3,409</td>
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<td>7,715</td>
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<tr>
<td>983.50</td>
<td>5,290</td>
<td>2,517</td>
<td>10,232</td>
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<table>
<thead>
<tr>
<th>Device</th>
<th>Routing</th>
<th>Invert</th>
<th>Outlet Devices</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>Discarded</td>
<td>981.00'</td>
<td>0.300 in/hr Exfiltration over Surface area</td>
</tr>
<tr>
<td>#2</td>
<td>Primary</td>
<td>981.85'</td>
<td>15.0” Round Culvert</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>L= 20.0’ CPP, mitered to conform to fill, Ke= 0.700</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Inlet / Outlet Invert= 981.85’ / 981.00’ S= 0.0425 '/' Cc= 0.900</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>n= 0.013, Flow Area= 1.23 sf</td>
</tr>
<tr>
<td>#3</td>
<td>Primary</td>
<td>983.10'</td>
<td>4.0' long x 4.0' breadth Broad-Crested Rectangular Weir</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2.50 3.00 3.50 4.00 4.50 5.00 5.50 6.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32</td>
</tr>
</tbody>
</table>

**Discarded OutFlow** Max=0.03 cfs @ 12.34 hrs HW=983.04’ (Free Discharge)

**Primary OutFlow** Max=3.95 cfs @ 12.34 hrs HW=983.04’ (Free Discharge)
Summary for Link 1L: Total

Inflow Area = 1.183 ac, 46.91% Impervious, Inflow Depth > 2.81" for 100 yr event
Inflow = 1.28 cfs @ 12.57 hrs, Volume = 0.277 af
Primary = 1.28 cfs @ 12.62 hrs, Volume = 0.277 af, Atten = 0%, Lag = 3.0 min

Primary outflow = Inflow, Time Span = 5.00-20.00 hrs, dt = 0.05 hrs
RESPONSIBLE PARTIES: The contractor and owner will be joint applicants under the MPCA’s General Stormwater Permit for Construction Activity as required by the National Pollutant Discharge Elimination System (NPDES) Phase II program.

The Contractor shall provide one or more trained Construction SWPPP Manager(s) knowledgeable and experienced in the application of erosion prevention and sediment control BMPs that will oversee the implementation of the SWPPP, and the inspections, maintenance, and monitoring of the erosion prevention and sediment control BMPs.

A Construction SWPPP Manager must be available for an on-site inspection within 72 hours upon request by the MPCA.

The SWPPP Designer, Construction SWPPP Manager, and BMP Installer must have appropriate training. Documentation showing training commencement with the job duties and responsibilities is required to be included in the SWPPP prior to any work beginning on the site. Training documentation for the SWPPP Designer is included on the Narrative sheet. The Contractor shall attach training documentation to the SWPPP for the Construction SWPPP Manager and BMP Installer prior to the start of construction. This information shall be kept up to date until the project NOT is filed.

The SWPPP Designer, Construction SWPPP Manager, and BMP Installer must have appropriate training. Documentation showing training commencement with the job duties and responsibilities is required to be included in the SWPPP prior to any work beginning on the site. Training documentation for the SWPPP Designer is included on the Narrative sheet. The Contractor shall attach training documentation to the SWPPP for the Construction SWPPP Manager and BMP Installer prior to the start of construction. This information shall be kept up to date until the project NOT is filed.

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The Contractor shall provide one or more trained Construction SWPPP Manager(s) knowledgeable and experienced in the application of erosion prevention and sediment control BMPs that will oversee the implementation of the SWPPP, and the inspections, maintenance, and monitoring of the erosion prevention and sediment control BMPs.

A Construction SWPPP Manager must be available for an on-site inspection within 72 hours upon request by the MPCA.

The SWPPP Designer, Construction SWPPP Manager, and BMP Installer must have appropriate training. Documentation showing training commencement with the job duties and responsibilities is required to be included in the SWPPP prior to any work beginning on the site. Training documentation for the SWPPP Designer is included on the Narrative sheet. The Contractor shall attach training documentation to the SWPPP for the Construction SWPPP Manager and BMP Installer prior to the start of construction. This information shall be kept up to date until the project NOT is filed.

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EROSION PREVENTION PRACTICES

Mulch, hydromulch, tackifier, or similar practice shall not be used in any portion of the wetted perimeter of a temporary or permanent stormwater system. No erosion prevention practices shall be utilized on roadsides at any time. The normal wetted perimeter of all ditches or swales, including storm water management pond slopes, that drain waters from the site must be stabilized within 200' of any property edge or discharge point, including storm sewer inlets, within 24 hours of the end of the work day or before the next precipitation event even if the activity is not complete.

Any sediment that escapes the site must be removed and the area stabilized within 7 calendar days of discovery unless precluded by the project schedule. All non-functioning BMPs and those BMPs where sediment reaches one-half (1/2) of the depth of the BMP, or in the case of sediment basins one-half (1/2) of the storage volume, must be repaired, replaced, or supplemented by the end of the next business day after discovery, or as soon as conditions allow.

All BMPs may be removed for specific safety concerns. The BMPs shall be replaced as soon as the safety concern is resolved.

Any sediment that escapes the site must be removed and the area stabilized within 7 days of any on-site event when the exercise of strict control is not adequate to limit the amount of sediment reaching the water body (in-work water restrictions). For public waters that have been promulgated "work in water restrictions" during fish spawning times, all exposed soil shall be covered to a minimum of 200' of the water's edge, and thus these waters must complete stabilization within 24 hours during the time period. MN DNR permits are not required for works that are no deeper than 3 feet of water. All uses of MN DNR stormwater permits that are not needed to protect surface water quality or downstream properties may be included in the MN DNR stormwater permit. Such permits are not required for any other activities. There are no restrictions for existing permits. If a MN DNR Permit has been issued for the project and it is later determined as insignificant, the Contractor shall submit all work covered by the MN DNR Permit until an Inland Waters Permit is obtained or that written notification is obtained stating that such permit is not required.

1. Accumulated sediment has been removed from all permanent stormwater treatment systems as necessary to ensure the system is operating as designed.

2. All sediment has been removed from conveyance systems.

3. All temporary erosion prevention and sediment control BMPs have been removed. BMPs designated on the SWPPP to remain in place until final stabilization.

4. For residential construction only, permit coverage terminates on individual lots if the structures are finished and temporary erosion prevention and downgradient perimeter control is complete, the residence sells to the homeowner, and the homeowner does not obtain an "In Water Use Permit Form" from the homeowner.

5. For agricultural only [i.e., pipelines across cropfield], the disturbed land must be returned to its preconstruction agricultural use prior to submitting the NOI.

For site investigation, all property on both sides of the project boundary that is within 200 feet of the project site shall be scanned for the potential presence of existing underground storage tanks and the results shall be reported to the Contractor.

Complete all reports concerning the storage of hazardous material and the results shall be supplied to the Contractor.

Fiscal year 2018 or subsequent fiscal year.

Exploring the temporary erosion prevention and sediment control requirements of this SWPPP as designed by the Engineer. If erosion prevention practices are required for the project, the Contractor shall prepare and submit to the Engineer a SWPPP amendment. All monitoring and inspection requirements of Section 10 of the Permit are required to be completed within 7 days of discovery unless precluded by the project schedule.

1. All inspections and all of the site must be stabilized within 200' of any property edge or discharge point, including storm sewer inlets, within 24 hours of the end of the work day or before the next precipitation event even if the activity is not complete.

2. Permanent cover has been installed with an established minimum uniform perennial vegetation density of 70 percent of its maximum capacity.

3. Accumulated sediment has been removed from all permanent stormwater treatment systems as necessary to ensure the system is operating as designed.

4. All sediment has been removed from conveyance systems.

5. All temporary erosion prevention and sediment control BMPs have been removed. BMPs designated on the SWPPP to remain in place until final stabilization.

6. For residential construction only, permit coverage terminates on individual lots if the structures are finished and temporary erosion prevention and downgradient perimeter control is complete, the residence sells to the homeowner, and the homeowner does not obtain an "In Water Use Permit Form" from the homeowner.

7. For agricultural only [i.e., pipelines across cropfield], the disturbed land must be returned to its preconstruction agricultural use prior to submitting the NOI.

8. Complete all reports concerning the storage of hazardous material and the results shall be supplied to the Contractor.
NOTE: POINT 'A' MUST BE 1'-0" MIN HIGHER THAN POINT 'B' TO ENSURE THAT WATER FLOWS OVER THE DITCH CHECK AND NOT AROUND THE ENDS.

12' MIN BLANKETS MUST OVERLAP BY 4" MIN

8" X 2" X 18" LONG WOOD STAKES AT 2'-0" SPACING DRIVE THROUGH NETTING AND FIBER ROLL

8, 11GA STAPLES SPACED 1'-0" ON CENTER

4" X 4" TRENCH BACKFILLED OVER EROSION CONTROL BLANKET

6" - 7" DIA. STRAW OR WOOD FIBER ROLL ENCLOSED IN PLASTIC OR POLYESTER NETTING

NOTE: ANCHOR, OVERLAP & STAPLE PER MANUFACTURER’S SPECIFICATIONS

ANCHOR SLOT ALTERNATIVE

Erosion Control Blanket Installation

Ditch Check - Bioroll

Not to Scale

SECTION A-A

Riprap at RCP Culvert End

Not to Scale

Hard Surface Public Road

3" minus washed coarse aggregate

[Table for minimum depth]

Rock Construction Entrance

Not to Scale

Subsurface Drain Cleanout

Not to Scale

Typical Basin Cross-Section

Not to Scale

Silt Fence - Machine Sliced

Not to Scale

PRIOR LAKE, MN

Prior Lake Pickleball Facility

Erosion Control Details

Not to Scale

C2.05

Sheet 5

Bolton & Menk, Inc. 2020, All Rights Reserved

H:\HOISI_PR\T18122360\CAD\C3D\122360C205.dwg 8/26/2020 8:20:56 PM
Subject  | PERMIT #2020.02: Pike Lake Outlet Culvert Replacement Project
Board Meeting Date  | September 10, 2020
Prepared By  | Maggie Karschnia, Water Resources Project Manager
Proposed Motion  | A motion authorizing PLSLWD staff to issue Permit #2020.02 to the City of Prior Lake, subject to the conditions listed below.

BACKGROUND

The City of Prior Lake proposes to replace a severely degraded corrugated metal pipe culvert at the outlet of Pike Lake. The proposed project will replace the failing culvert with an equivalent culvert. EOR was the engineer for the City on the project and they ensured that the replaced culvert will approximate existing flow conditions.

Notice to Adjacent Landowners

As the only landowners within 500 feet of the planned improvements are the City of Prior Lake and SMSC, no notification to nearby residents was required. A written notice was sent to SMSC.

Note to Permit Applicant:

This report is not a permit. If the District Board approves the project, the applicant must then obtain a permit through the District staff.

Proposed Plan and Analysis

The project was reviewed for compliance with the following PLSLWD Rules:

**Erosion and Sediment Control (Rule E)**

While the size of the project would not normally trigger Rule E as it will disturb an area less than one acre, it is required to accompany Rule H. The City has net-less erosion control blanket and seeding listed in the plans for erosion control, but no biologs or other sediment control are specifically identified. It is recommended that sediment control measures be incorporated.

**Bridge and Culvert Crossings (Rule H)**

Any activity that constructs, improves, repairs or alters a driveway, road or utility across the Prior Lake outlet channel or a watercourse with a tributary area in excess of 100 acres triggers this Rule. The District requires that culvert crossings retain adequate hydraulic capacity, have no adverse effects on water quality, represent the lowest impact solution, and allow for future erosion, scour, and sedimentation considerations. The culvert repair activity under this permit conforms with the activities that were previously approved with the original permit.
**Discussion**

**Watershed District Board Decision:**
The application was initially received on August 27, 2020 and determined to be complete. To meet the procedural requirements of Rule B and Minnesota Statutes Section 15.99 regarding time deadlines for Board action, the Board must make a decision to either:

1. approve or deny the permit application by October 26, 2020
2. provide written notice to the applicant of an extension of the 60-day period and state the reasons for the extension and its anticipated length, which may not exceed 60 days unless approved by the applicant.

**Options for Action:**
1. Approve the application subject to the conditions noted herein.
2. Table the item until a future date specified and provide the applicant with direction on the issues that have been discussed.
3. Deny the application, stating the reasons for the denial.
4. Other specific actions as directed by the Board of Managers.

**Recommendation**

**Staff Recommendation:**
District staff recommends Option 1, that the project be approved subject to the application submitted, the supplemental information submitted by the applicant’s engineer, and with the conditions noted below.

**Action Required:**
A motion authorizing PLSLWD staff to issue a permit, subject to the following conditions:

1. The permittee shall obtain all other required permits and approvals.
2. The permittee shall supply the District an as-built survey within 35 days of project completion. The District shall review this survey as a part of the certificate of completion for the project.
3. The District will waive the requirement for a permit fee deposit.
4. The permittee is responsible for the stabilization and maintenance of the adjacent areas disturbed by the construction.
5. The permittee will incorporate sediment control measures and provide contact information for the responsible erosion control contractor prior to initiating work.
ALL DISTURBED VEGETATED AREAS TO BE STABILIZED W/ MNDOT 35-241 MIX AND MNDOT CAT. 0 (NET-LESS) EROSION CONTROL BLANKET

REPLACE CSAP (APPROX. 48" X 35") W/ 12 LF 51" X 31" RCAP

EXISTING 24" RCP (TO REMAIN)

SALVAGE GRAVEL AND RESTORE DRIVEWAY (SUPPLEMENT W/ CL. 5 AS NECESSARY)
Prior Lake - Spring Lake Watershed District (PLSLWD)
4646 Dakota Street SE, Prior Lake, MN 55372, 952-447-4186

PERMIT APPLICATION, PAGE 1 OF 2

Note to Applicant: use this as the cover sheet for your application materials.

PROJECT NAME

Pike Lake Outlet Culvert Replacement

APPLICATION #: (to be assigned)

Name of Owner - Applicant

Phone #: 952-447-9831

City of Prior Lake

Fax #: 952-447-4245

Owner's Agent/Engineer:

Name Emmons & Olivier Resources, Inc.

Address of Owner - Applicant (Street, City, State, Zip Code)

4646 Dakota Street SE, Prior Lake, MN 55372

Phone 651-203-6024

Owner's Contact:

Name Pete Young, City of Prior Lake

Address T115N, R22W, Section 23; PID 259230142; 4270 140th Street NE, Prior Lake, MN 55372

E-mail pyoung@cityofpriorlake.com

Project size (acres) 0.04 acres

PERMIT CATEGORY (check applicable type(s))

☐ Land Disturbance (C)

☐ Floodplain Alteration (F)

☐ Drainage Alteration (I)

☐ Stormwater Mgt (D)

☐ Wetland Alteration (G)

☐ Buffer Strips (J)

☐ Erosion & Sediment Ctrl (E)

☐ Bridge & Culvert Crossings (H)

☐ Other: ________________

PROJECT DESCRIPTION

Two existing culverts constitute the outlet of Pike Lake and are part of the Prior Lake Outlet Channel. One culvert is a reinforced concrete pipe in good condition. The other culvert is a corrugated metal pipe that is severely degraded and must be replaced before it fails. The proposed project will replace the failing culvert with an equivalent culvert. The City worked with Emmons and Olivier Resources, the engineer for the PLSLWD, to design the project and to ensure that the replaced culvert will approximate existing flow conditions.

GENERAL CONDITIONS

1. The Permittee grants to the District, and its agents, employees, officers and contractors, a license to enter the Project to perform any inspections or work authorized by the Permit or any applicable law. This license shall expire after acceptance of the work by the District and issuance of a Certificate of Completion.

2. The Permittee shall indemnify, defend and hold the District and its agents, employees and officers harmless for all claims made by itself and third parties for damages or loss sustained or costs incurred, including engineering and attorneys' fees, as a result of issuance of the Permit or construction of the Project.

3. The Permittee shall provide the District with a Permit Fee Deposit in accordance with District requirements (see page 2). The Permit Fee Deposit will be held in escrow and used by the District to pay the actual costs incurred by the District, including engineering and legal fees, to process and review the Permit Application, to inspect and monitor the activities authorized by the Permit, and to ensure compliance with the District's rules. The Permittee shall fully pay all bills submitted to it by the District within seven days of receipt. Bills not so paid shall accrue interest at the rate of 8% per year.

4. The Permittee shall obtain such easements as may be required for construction of the Project and provide in the final plat for the Project utility and drainage easements acceptable to the District to protect all hydrologic features within the Project and to provide access for the maintenance of the stormwater management facilities to be constructed pursuant to the Permit.

5. To assure full compliance with the terms of the Permit, the Permittee shall deposit with the District a cash security or irrevocable letter of credit in a form and from a surety satisfactory to the District, in the amount specified under the Special Conditions of the Permit, once issued.

6. By acceptance of the Permit, Permittee acknowledges and agrees to perform and be bound by all general and special terms and conditions of the Permit.

CONTINUED ON NEXT PAGE
**PRIOR LAKE - SPRING LAKE**  
**WATERSHED DISTRICT**  

**PERMIT APPLICATION, PAGE 2 OF 2**  
Prior Lake - Spring Lake Watershed District (PLSLWD)  
4646 Dakota Street SE, Prior Lake, MN 55372, 952-447-4166  

**PROJECT NAME:** Pike Lake Outlet Culvert Replacement  
**APPLICATION #:** (to be assigned)  

---  

**Permit Fee Deposit - to be paid with your application:**  
Instructions: Calculate the required Permit Fee Deposit by totaling the amounts from items A through D below (as applicable). Include the Permit Fee Deposit with your application. Checks may be payable to the Prior Lake-Spring Lake Watershed District.  

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Amount ($)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>A)</td>
<td>Grading or Alteration: less than one acre</td>
<td>$500</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td>1.0 to 4.99 acres</td>
<td>$1,000</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td>5.0 to 9.9 acres</td>
<td>$1,500</td>
<td>n/a</td>
</tr>
<tr>
<td></td>
<td>20 acres or more</td>
<td>$2,000</td>
<td>n/a</td>
</tr>
<tr>
<td>B)</td>
<td>Projects with Wetland or Flood Plain Areas</td>
<td>$1,000</td>
<td>n/a</td>
</tr>
<tr>
<td>C)</td>
<td>Bridge or Culvert Crossing of a Waterbody or Ditch</td>
<td>$1,500 per crossing</td>
<td>n/a</td>
</tr>
<tr>
<td>D)</td>
<td>Drainage Alterations</td>
<td>$1,500</td>
<td>n/a</td>
</tr>
</tbody>
</table>

**Total Permit Fee Deposit due with application**  

\[ \text{Total} = \text{Fill in amount here:} \]  

---  

**Permit Fee Deposit information and conditions:**  
1. The Permit Fee Deposit will be held in escrow and used to pay the District’s costs for reviewing the application and administering the permit (if approved), including staff costs, and engineering and legal fees.  
2. If at any time the Permit Fee Deposit falls below 25% of the original amount, the District shall notify the applicant to replenish the fee deposit to the original amount.  
3. Upon application approval, a separate permit security escrow shall be required from the applicant prior to permit issuance.  
4. Upon final completion of the project and the issuance of a Certificate of Completion by the District, the District shall return any unpaid balance in the Permit Fee Deposit to the applicant, less a $10 application fee. The District does not pay interest on escrow deposits.  

---  

I hereby apply under District Rule B for a permit to complete the proposed project in accordance with the information submitted with this Application and the District’s Rules, and I agree to the conditions on page one and two of this application.  

**Signature of Owner - Applicant**  

**Your Name - please print**  

**Date Submitted**  

Application Received  

**Permit Fee Deposit Amt**  

Received (y/n)  

**District Representative**
Project Name | PLOC Pike Lake Park Crossing  
To | Pete Young, City of Prior Lake  
Cc | Diane Lynch, PLSLWD District Administrator  
PLOC Cooperators  
From | Carl K. Almer & Trevor Rundhaug  
Regarding | East Culvert Replacement Guidance  

**Purpose and Background**

The purpose of this memorandum is to provide design guidance for one of the two culverts that presently act as the outlet control for Pike Lake. Drainage through Pike Lake – which is located along the Prior Lake Outlet Channel – is conveyed downstream through a 24” RCP and a deformed CMP approximately 35” high and 48” wide. In addition to being deformed, the latter is also degraded and in need of replacement. The City of Prior Lake requested that the District use the PLOC XPSWMM model to help provide insight into appropriate sizing of a replacement culvert.

**Summary of Findings**

Both a round (“RCP”) and an arch (“RCAP”) pipe were considered for the replacement, as an arch pipe would likely mimic the existing pipe capacity more closely than a round pipe. Culvert sizing was evaluated in two separate scenarios in order to (1) match the existing capacity of the outlet, and (2) comply with the design capacity requirements as laid out in the Prior Lake Outlet Channel (PLOC) Crossing Design Guidance:

“For minor roads (i.e. collector and smaller), culverts must be designed to convey storm flow resulting from at least the 25-year, Atlas 14 precipitation event using a 24-hour, MSE 3 MN rainfall distribution, plus 65 cfs.”

Constraints on the redesign included maintaining the existing inlet invert elevation and a minimum pipe cover of 12-inches. There is likely limited opportunity to raise the road profile without resulting in wetland impact.

Table 1 summarizes the sizes of the RCP and RCAP that would be required to meet or slightly exceed existing culvert capacity.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Culvert Size</th>
<th>Full Flow Capacity (cfs)</th>
<th>Pike Lake 25-yr HWL* (ft)</th>
<th>Cover (ft)</th>
<th>Road Elevation Increase to Maintain 12-inch Freeboard (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing</td>
<td>35” x 48” (approx.)</td>
<td>~72</td>
<td>823.9</td>
<td>~1</td>
<td>-</td>
</tr>
<tr>
<td>RCP</td>
<td>33”</td>
<td>82</td>
<td>824.0</td>
<td>0.7</td>
<td>Yes (0.3 ft)</td>
</tr>
<tr>
<td>RCAP</td>
<td>36” equiv. (27” x 44”)</td>
<td>88</td>
<td>824.1</td>
<td>1.4</td>
<td>No</td>
</tr>
</tbody>
</table>

*The minor increase in HWL is because of the shape of the existing culvert*
Table 2 summarizes the sizes of the RCP and RCAP that would be required to comply with PLOC Crossing Design Guidance, which requires a culvert with capacity to convey the 25-year, 24-hr storm without overtopping the road crossing (823.8 feet).

Table 2. Culvert Design Scenario 2: Comply with PLOC Crossing Design Guidance

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Culvert Size</th>
<th>Pike Lake 25-yr HWL (ft)</th>
<th>Cover (ft)</th>
<th>Road Elevation Increase to Maintain 12-inch Freeboard (Yes/No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing</td>
<td>35” x 48” (approx.)</td>
<td>823.9</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>RCP</td>
<td>42”</td>
<td>823.8</td>
<td>0</td>
<td>Yes (1.1 ft)</td>
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<tr>
<td>RCAP</td>
<td>42” equiv. (31” x 51”)</td>
<td>823.7</td>
<td>0.8</td>
<td>Yes (0.1 ft)</td>
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<tr>
<td>RCAPi</td>
<td>42” equiv. (31” x 51”)</td>
<td>823.7</td>
<td>0.9</td>
<td>No</td>
</tr>
</tbody>
</table>

The inlet invert was lowered 0.1-feet from 820.0 to 819.9 to increase the cover. This is the invert elevation of the 24-inch RCP so there is no concern with respect to changing the existing runout elevation of the lake.

Table 3 summarizes the change in high water elevation for the 25-year, 24-hour storm and the 100-year, 24-hour storm for each design scenario. The maximum predicted downstream change in for these scenarios is a 0.4-feet increase at the Strauss driveway. The 42” equivalent RCAP with a lowered invert elevation is the only scenario predicted to prevent overtopping of the Strauss driveway during the 100-year, 24-hour storm.

Table 3. Change in Downstream Peak HWL for each Design Scenario.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Change in 25-yr HWL (ft)</th>
<th>Change in 100-yr HWL (ft)</th>
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<tbody>
<tr>
<td></td>
<td>Pike Lake</td>
<td>Camp Kici Yapi</td>
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<tr>
<td>Road Elevation</td>
<td>823.8</td>
<td>822.9</td>
</tr>
<tr>
<td>Existing</td>
<td>823.9</td>
<td>823.9</td>
</tr>
<tr>
<td>33” RCP</td>
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<td>36” equiv. RCAP</td>
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<td>42” RCP</td>
<td>-0.2</td>
<td>+0.2</td>
</tr>
<tr>
<td>42” equiv. RCAP</td>
<td>-0.2</td>
<td>+0.1</td>
</tr>
<tr>
<td>42” equiv. RCAPi</td>
<td>-0.2</td>
<td>+0.1</td>
</tr>
</tbody>
</table>

The pipe invert was lowered to 819.9 ft.

**Recommendation**

Based on this analysis and in order to meet the PLOC Crossing Design Guidance, our preliminary recommendation pending TAC/cooperator discussion regarding the impact of increased capacity is to install a 42” equivalent (31” x 51”) RCAP to replace the degraded pipe.
I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

KYLE D. CRAWFORD
DATE: 08/19/2019
LICENSE # 54906

PIKE LAKE OUTLET CULVERT REPLACEMENT
PRIOR LAKE, SCOTT COUNTY, MINNESOTA

EXISTING UTILITIES

THE LOCATION OF UNDERGROUND FACILITIES AND/OR STRUCTURES AS SHOWN ON THE PLANS ARE BASED ON AVAILABLE RECORDS AT THE TIME THE PLANS WERE PREPARED AND ARE NOT GUARANTEED TO BE COMPLETE OR CORRECT. THE CONTRACTOR IS RESPONSIBLE FOR CONTACTING ALL UTILITIES 72 HOURS PRIOR TO CONSTRUCTION TO DETERMINE THE EXACT LOCATION OF ALL FACILITIES AND TO PROVIDE ADEQUATE PROTECTION OF SUBSURFACE UTILITIES DURING THE COURSE OF WORK.

CONSTRUCTION NOTE

CONTRACTOR SHALL TAKE ALL NECESSARY MEASURES TO MAINTAIN OPERATION OF EXISTING UTILITIES THROUGHOUT THE DURATION OF THE PROJECT. IN THE EVENT THAT AN INTERRUPTION OF SERVICE IS UNAVOIDABLE IN ORDER TO COMPLETE THE WORK, CONTRACTOR SHALL PROVIDE ADEQUATE NOTIFICATION TO ALL AFFECTED BUSINESSES A MINIMUM OF 3 WORKING DAYS IN advance OF ANY INTERRUPTION.

Gopher State One-Call

IT IS THE LAW THAT ANYONE EXCAVATING AT ANY SITE MUST NOTIFY GOPHER STATE ONE-CALL (651) 770-8448 OR 1-800-252-1166 SO THAT UNDERGROUND ELECTRIC, NATURAL GAS, TELEPHONE OR OTHER UTILITY LINES CAN BE MARKED ON OR NEAR YOUR PROPERTY. FAILURE TO NOTIFICATION RESULTS IN A PENALTY. IF NOTIFIED, COMPANIES HAVE 48 HOURS TO MARK UTILITIES. CALL TO SECURE INFORMATION PRIOR TO DIG. DIGGING WITHOUT CALLING IS A CRIMINAL OFFENSE.

GOVERNING SPECIFICATIONS

THE 2018 EDITION OF THE MINNESOTA DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR CONSTRUCTION" SHALL GOVERN ALL TRAFFIC CONTROL DEVICES AND SIGNING SHALL CONFORM TO MINNESOTA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, INCLUDING FIELD MANUAL FOR TEMPORARY CONTROL ZONE LAYOUTS.

SHEET LIST TABLE

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<thead>
<tr>
<th>SHEET NUMBER</th>
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<td>02</td>
<td>PLAN &amp; PROFILE</td>
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<tr>
<td>03</td>
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</table>

CLIENT

CITY OF PRIOR LAKE
4646 DAKOTA STREET SE
PRIOR LAKE, MN 55372

ENGINEER

Emmons & Olivier Resources, Inc.
7030 6TH STREET NORTH
OAKDALE, MINNESOTA 55128
TELEPHONE: (651) 770-8448
FAX: (651) 770-2552
www.eorinc.com
1. CONTRACTOR SHALL NOT COMMENCE WORK UNTIL FLOWS HAVE SUBSIDED TO ALLOW EASE OF DIGGING & RESTORATION OF DRIVEWAY TO ORIGINAL ELEVATION AND WIDTH. Contractors shall maintain the area disturbed by grading at any given time and to complete vegetation restoration within the time required by the permit after completion of grading of an area.

2. CONTRACTOR TO ADHERE TO ALL CITY, WATERSHED, MNDOT PERMIT REQUIREMENTS INCLUDING THE REQUIREMENT TO MAINTAIN THE AREA DISTURBED BY GRADING AT ANY GIVEN TIME AND TO COMPLETE VEGETATION RESTORATION WITHIN THE TIME REQUIRED BY THE PERMIT AFTERTHE FLOWS HAVE SUBSIDED TO ALLOW EASE OF DIGGING & RESTORATION OF DRIVEWAY TO ORIGINAL ELEVATION AND WIDTH.

3. ALL EXCAVATED AREAS SHALL BE STABILIZED WITHIN 24 HOURS.

4. WHERE NECESSARY, INLET PROTECTION IS TO BE USED DURING CONSTRUCTION.

5. CONTRACTOR SHALL MONITOR EROSION AND SEDIMENT MOVEMENT DURING CONSTRUCTION AND INSTALL EROSION AND SEDIMENT CONTROL MEASURES AS THEY BECOME NECESSARY.

6. REMOVE ALL EROSION CONTROL MEASURES AFTER THE WORK HAS BEEN COMPLETED AND VEGETATION ESTABLISHED.

7. THE CONTRACTOR SHALL REMOVE ALL SOILS AND SEDIMENT TRACKED INTO EXISTING STREETS AND FREEWAYS 30 FEET OF NOTICE. A CONSTRUCTION ENTRANCE SHALL BE INSTALLED IF TRACKING BECOMES AN ISSUE.

8. STOCKPILE TOPSOIL, GRANULAR fill and ROAD BASE MATERIAL ON SITE.

9. CONTRACTOR SHALL STRIP, STOCKPILE AND RE-SPREAD EXISTING ON-SITE TOPSOIL TO PROVIDE A UNIFORM THICKNESS OF AT LEAST 6 INCHES ON ALL DISTURBED AREAS TO BE SEEDED. THIS SHALL BE INCIDENTAL TO THE PROJECT.

10. FINAL GRADING TOLERANCES ARE ±0.1 FEET OF EXISTING SITE GRADES.

11. ALL EXCESS MATERIAL, BITTUMINOUS SURFACING, CONCRETE ITEMS, ANY ABANDONED UTILITY ITEMS AND OTHER UNSTABLE MATERIALS SHALL BE DISPOSED ON SITE PER CITY'S DIRECTION. DISPOSAL SHALL BE DONE IN A MANNER THAT MEETS ALL APPLICABLE REGULATIONS.

12. CONTRACTOR IS RESPONSIBLE FOR GRADING AND SLOPING THE FINISHED GROUND SURFACE TO PROVIDE SMOOTH & UNIFORM SLOPES.

13. ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INCIDENTAL TO THE CONTRACT. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO BRING TO THE ENGINES ATTENTION ADDITIONAL ITEMS FOR INSTALLATION.

14. SEEDING SHALL FOLLOW 2014 MNDOT SEEDING MANUAL.

15. ACCEPTABLE SEEDING DATES ARE APRIL 15 - JULY 20 IN THE SPRING, OR SEPTEMBER 20 - OCTOBER 20 IN THE FALL. WRITTEN PERMISSION MUST BE GRANTED BY THE ENGINEER TO PERFORM SEEDING OPERATIONS ON ANY OTHER DATE OF THE YEAR.

STORM SEWER NOTES

1. ALL PIPE JOINTS SHALL BE WRAPPED AND TIED PER CITY AND MNDOT SPECIFICATIONS (2016).

2. CULVERT INVERTS SHALL BE ±0.05 FEET OF PLAN ELEVATIONS.

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STORM SEWER NOTES

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Background

The District’s Citizen Advisory Committee (CAC) is composed of residents of the watershed district and advises the Board of Managers on topics relevant to the District. The CAC reviews applications for new members and provides a recommendation for membership to the Board.

Discussion

Upon review of the application for Ben Burnett, the CAC feels that Mr. Burnett would be a valuable addition to the CAC.

Recommendation

The CAC and staff recommend that the Board move to approve the application of Ben Burnett for membership to the CAC.
**Name:** Ben Burnett  
**Address:** 3040 Creekview Cir SW  Prior Lake, MN 55372  
**Phone:** 952-226-3951  
**E-mail:** burnettb317@gmail.com  
**Occupation:** Programmer / Project Manager / R&D Computer Scientist  
**Employer:** ATCorp  
**Employer’s Address:** 9971 ValleyView Rd  Eden Prairie, MN 55344  
**How long have you lived in the District?** 19 yrs, Since June 2001  

Please state briefly why you are interested in serving on the Citizen Advisory Committee:

The creek between Spring Lake and Prior Lake goes through my backyard and I’m interested in learning more about the water issues as well as helping to maintain and improve water quality throughout the Prior Lake-Spring Lake Watershed District.

What focus area would you like to volunteer to assist the CAC with in 2020?

- Shoreline Restoration (Water Quality) _X_  
- Fish Stocking (Water Quality & AIS) _X_  
- Storage Assessment, Plans & Wetland Banking (Reduce Flooding) _X_  
- Grants/Fundraising (Administration) _____  
- 50th Anniversary (Administration & Water Quality)_____  
- Bylaws Update (Administration)_____  
- Other ideas you would like the CAC to consider_____
Conflict of interest is defined as the participation in any activity, recommended action, or decision from which the individual has or could have the potential to receive personal gain, whether it be direct or indirect. In accordance with this definition, do you have any legal or equitable interest in any business, however organized, which could be construed as a conflict of interest?

Yes ___  No  X  If yes, please provide details:

Are you related to any Watershed District Board Member or to any member on the Citizens Advisory Committee? If so, give name and relationship.

No

Other qualifications, experience, information or comments you would like to submit.

I am a Federal DoD contractor doing project management for million+ dollar contracts, overseeing research and development efforts. I have experience managing budgets, projects, and people.

I'm involved with research and development and often have to read academic papers and professional research to quickly get an understanding of new technologies and findings to develop new ideas and apply to current problems and projects. I believe this would be useful for water and watershed issues as well.

PERSONS WITH DISABILITIES ARE ENCOURAGED TO APPLY

RETURN THIS COMPLETED APPLICATION FORM TO:
Diane Lynch
Prior Lake-Spring Lake Watershed District
4646 Dakota Street SE
Prior Lake, MN  55372
dlynch@plslwd.org
(952) 440-0067

This application will be kept on file for 12 months.
Members Present: Mike Myser, Curt Hennes, Steve Pany, Frank Boyles & Bruce Loney

Staff & Consultants Present: Diane Lynch, District Administrator
Maggie Karschnia, Project Manager
Jaime Rockney, Water Resource Specialist
Kathryn Keller-Miller, Water Resources Assistant
Carl Almer, EOR, District Engineer

Woody Spitzmueller, CAC

- CALL TO ORDER/PLEDGE OF ALLEGIANCE, OATH OF OFFICE FOR NEW MANAGER FRANK BOYLES:
  Meeting called to order by President Myser at 6:00 PM.

- 2.0 PUBLIC COMMENT: None

- 3.0 APPROVAL OF AGENDA
  Manager Loney moved to approve the agenda. Second by Manager Hennes. All ayes. Motion passed 5-0.

  OTHER OLD/NEW BUSINESS

- 4.1 INTERN UPDATE
  Shauna Capron and Katelyn Barclay, summer interns, presented on their time with the District. Shared what project they worked on, what they learned and what they will take with them in their future endeavors.

- 4.2 PROGRAMS & PROJECT UPDATES
  Staff gave updates on current and ongoing District projects and activities, focusing on Water Quality, Upper Subwatershed Storage and AIS.
• **4.3 IPM PLAN STATUS**  

• **4.4 UPPER WATERSHED BLUEPRINT UPDATE**  
Brian Kallio, Wenck, gave an update on the project. Discussion only. No vote taken.

• **4.5 FISH STOCKING PLAN RECOMMENDATION**  
Manager Loney moved to approve the fish stocking recommendation given by Maggie Karschnia. Second by Manager Pany. Program to be funded by $6,340 to be transferred from 652 MS4 Education Program and $2,000 each from the Spring Lake and Prior Lake Associations. All ayes. Motion passed 5-0.

• **5.0 APPROVAL OF CONSENT AGENDA**  
Manager Hennes moved to approve the Consent Agenda after adding a WaterGuards invoice to the Claims List. Second by Manager Boyles. All ayes. Motion passed 5-0.

• **6.0 TREASURER REPORT/FINANCIAL REPORT**  
Manager Loney summarized the Treasurer’s Report and provided updates on District finances.

• **7.0 MANAGER PRESENTATIONS ON WATERSHED RELATED ITEMS**  
Discussion only. No vote taken.

• **8.0 UPCOMING MEETINGS/EVENTS**  
  - CAC Meeting, Thursday, August 27, 6:30 – 8:00 PM

**ADJOURNMENT**  
Manager Hennes moved to adjourn meeting. Second by Manager Pany. All ayes. Motion passed 5-0. Meeting adjourned at 7:50 PM.

____________________________________________
Steve Pany, District Secretary
WORKSHOP MEETING MINUTES  
Tuesday, August 13, 2020  
Prior Lake City Hall, Parkview Room

Members Present: Curt Hennes, Charlie Howley, Bruce Loney & Mike Myser

Staff Present: Diane Lynch, District Administrator

Others Present: Frank Boyles, future Board Manager; Carl Almer, EOR; Pete Young, Prior Lake; Glenn Kelley, Spring Lake Township; Woody Spitzmueller, CAC and Jim Fitzsimmons, Scott SWCD

The meeting was called to order by President Mike Myser at 4:00 p.m.

2021 Draft Budget
Diane Lynch reviewed the draft budget and staff memo. Managers discussed the requirements for education and outreach; potential need to issue a bond and possibly change the budget codes re. capitol projects and their budget priorities. There was a consensus to keep the levy at $1.794, which is the same as it has been since 2018.

Working Together with the CAC
Managers Myser and Loney discussed Board expectations of the CAC.

Catch Basins, Street Sweeping.
Pete Young and Manager Loney discussed a possible Public Infrastructure Partnership project to be budgeted at $20,000 in 2021. Mr. Young was asked to put together a more detailed memo for consideration at the September Board Workshop.

Treasurer’s Report Format
Manager Loney asked if the managers supported his revised Report format. They did.

Discuss and Approve Liaison Appointments
Manager Boyles will be the liaison for the City of Prior Lake Council meetings and CEC. Manager Pany will be the liaison for the Lower Minnesota Watershed District.
**Updates**

**FEMA.** Diane Lynch is working with HSEM so that the Downed Trees and Sediment Delta reimbursement request can be made to FEMA ASAP.  **Upper Prior Alum Treatment.** The District has received its grant reimbursement for the Upper Prior Alum Treatment from the Board of Soil and Water Resources.  **Sutton Lake.** Diane reported that she is working with the District attorney to pull together legal documents so the property owners can sign the easements.  **Financial System.** The Board will check back on this at the end of the year.  **Fall Tour.** The managers would like a fall tour after the UW Blueprint is mostly complete so they have an idea of where projects could be.

The meeting was adjourned at 5:50 p.m.
Attendees:
- **CAC Members present:** Christian M, Christopher C, Matt N, Jim W
- **Others present:** District Staff: Kathryn K-M; Board Members: Curt H; Guest: Ben Burnett (potential new member)

I. **Call meeting to order 6:30 pm** – Chair Christian Morkeberg

II. **Agenda-Additions-Approval of Agenda & July 2020 meeting minutes.**
   a. **Agenda approved with additions:**
      i. Discussion of possible new CAC member, Ben Burnett
      ii. Lake vegetation on Spring Lake (Jim W)
   b. **July meeting minutes approved**

III. **CAC Business**
   a. **New member application for Ben Burnett**
      i. Ben Burnett gave brief introduction of himself. Lives on the creek that connects Spring and Prior Lakes. Interested in water quality issues and wanted to get more involved. Has a background with 4H. In his professional life he started as a computer programmer and is now a project manager who works in R&D on a lot of defense contracts. He is used to learning about new things quickly and doing research. He doesn’t get out on the lake much because he doesn’t have a boat but mostly appreciates the nature and wildlife along the creek, visits the beach with his family.
      ii. **CAC voted to recommend Ben Burnett to the Board of Managers for addition to the CAC.**
   b. **Communication with the Board of Managers**
      i. Christopher – found guidelines helpful
      ii. Jim – communication should go two ways. How does Board communicate things they want feedback on with the CAC? Several CAC members would like formal method for this.
         1. Some board members direct questions to Christian
         2. Bruce should be the communicator since he is the Board’s liaison to the CAC. Will add a spot to the CAC agenda for Bruce to provide updates from the Board and ask for feedback from the CAC.
      iii. Communications structure approved by CAC.
   c. **2021 Budget**
      i. Special board workshop to discuss budget – open to the public. **Sept 9, 4:00-7:30 pm**
      ii. CAC had no additional budget requests
   d. **Boat traffic**
      i. No big updates. Not a lot of appetite for City ordinance to limit boat traffic on the lake. Matt reported that Fish Lake has had a lot of extra boat traffic, including from the
campground this year. Both Matt and Christopher reported that there was a significant drop in the boat traffic on Fish Lake and Spring Lake, respectively, in the last week or two.

ii. Jim talked to someone from the DNR who said that the DNR doesn’t have a position on regulating boat traffic as they have deemed it a local issue.

e. Matt brought up an additional issue to look into regarding using bacteria cultures to eat up excess nutrients in lakes and ponds to clear up water quality. The original research was on ponds and use originated in wastewater treatment plants. Take natural cultures out of lakes, grow them in a lab and return them to the lake. Comes in pellet form (for homeowners) and liquid form. Approval is state by state. Some types are approved in MN but approval for use on lakes is more unclear. The bacteria eat up nutrients and convert them to gases. Often called “muck digesters.” Used to be relatively cheap but price has gone up as marketing has taken off. Are high and low temp varieties available. Need to be careful of fish kills in some locations because the bacteria use oxygen and could deplete water oxygen levels. Bacteria can eat up muck on lake and pond bottoms. Bacteria generally dies off when water temperatures are below 55°F. Can see effect in about 3 weeks. Matt noted that on Fish Lake many homeowners treated curlyleaf pondweed. However, the chemicals used contained copper that killed lake bacteria so the vegetation that died off wasn’t being broken down and lake bacteria needed to be rebalanced. Matt could present more on the bacterial cultures at next CAC meeting.

IV. August Board meeting update – Woody (sent summary to Christian ahead of time)

a. Board discussed the 2021 budget; communication with the CAC; Sutton Lake project, hope to start this fall, still need to complete easements; upper watershed blueprint update; summer interns finished and gave presentation; update on fish stocking.

b. September Board Meeting attendee – Ben

V. Staff Project Updates

a. Hike the Watershed going well, was highlighted by the local newspaper. Jim said his coffee group has been rotating between the parks. Christian noted that the prairie flowers by Arctic Lake are beautiful right now and urged everyone to check it out.

VI. Subcommittee Reports

a. 50th Anniversary (Kim)

i. Hike the Watershed highlighted by local newspaper. Curt complemented the 50th anniversary initiatives including the brochure and Hike the Watershed.

b. Fish Stocking (Christian)

i. Stocking was approved at the August Board meeting. Will be stocking bluegills and walleye for Spring and Prior Lakes. The stocked walleye will be larger than the ones the DNR stocks. Rotary is in favor of funding but won’t approve funds until October meeting. Spring Lake Association upped their contribution to $2000. PLA is contributing $2000.

c. AIS/Signage (Jodi)

i. Christian, Curt and Diane met with Eric from the company that makes I-LIDS. I-LIDS would be paired with communication with the community. Can be combined with inspectors as well. I-LIDS would be supplemental to other efforts. Cost of I-LIDS would be low compared with costs if lake becomes infested with new AIS. Could make sense to do test site at Spring Lake launch due to AIS currently in (and not in) the lake, though argument could be made for Prior Lake because it is busier. Can use I-LIDS to identify launch patterns and use this to better schedule inspectors. Possible to offer funding to sheriff to pursue violations? How many violations would be sent their way? Some inspectors are good, but others are very passive and not willing to confront people. SLA just posted about boat inspections on Facebook. Could also put together tools for boats to use at launches to clean their boats. CAC keep working on AIS and put together a recommendation to present to the Board.
d. **Shoreline Restoration** (Christopher, Matt)
   i. No updates. Christian send them some materials to review.

e. **Storage Assessment, Plans and Wetland Banking** (Woody, Jim, Christopher)
   i. Waiting for engineering report from upper watershed blueprint.

VII. **Goals & Topics for Upcoming Meeting**

a. Update of Upper Watershed Blueprint
b. Quick review of budget
c. Further discussion on lake bacteria that Matt discussed
d. Update from Steve McComas on lake vegetation
e. Continued discussion of AIS prevention strategies and I-LIDS

VIII. **Staff & Other Announcements**

IX. **Adjourn** – 8:04 pm
Managers will consider approving this claims list - Staff payroll and Manager per diems have already been paid via ADP. After the managers vote, two Managers will sign checks within three days of the meeting for approve claims. Then, staff will US mail checks (written on the Old National Bank) to the claims list parties. Staff will request that all vendors provide information on their invoices to fit into the categories below.

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<td>Spring Lake West Subshed BMP Feasibility</td>
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<td>WSB</td>
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<td>Barr Engineering</td>
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<td><strong>Subtotal</strong></td>
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<td><strong>TOTAL</strong></td>
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### 2020 Source of Funds

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<tr>
<th>Program Element</th>
<th>2020 Levy</th>
<th>Budget Reserve</th>
<th>Grant Funds/Fees</th>
<th>2020 Expenditure Budget</th>
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<tbody>
<tr>
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<td>706 - Office Supplies</td>
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<td>709 - Insurance and Bonds</td>
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<td>670 - Accounting</td>
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<td>671 - Audit</td>
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<td>903 - Fees</td>
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<td>660 - Legal (not for projects)</td>
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#### Programs and Benefits (not JPA/MDA)

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<th>2020 Levies</th>
<th>Budget Reserve</th>
<th>Grant Funds/Fees</th>
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<td>611 Cost-Share Incentives</td>
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<td>611 Highway 13 Wetland, FeCl system &amp; Desilt, O&amp;M</td>
<td>57,800</td>
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<td>611 Fish Point Park Retrofits</td>
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<td>611 Indian Ridge Maintenance</td>
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<td>611 Pelee Lake TMDL Implementation</td>
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<td>611 Feasibility Reports</td>
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<td>626 GDU Plan Review</td>
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<td>626 District Plan Update</td>
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<td>626 Engineered structures for programs</td>
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<tr>
<td>648 Permitting and Compliance</td>
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<tr>
<td>648 Update MOAs with cities &amp; county</td>
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<td>626 Comprehensive Wetland Plan Update</td>
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<td>626 Boundary Change Exploration</td>
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<td>-</td>
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<td>648 Non-project Reg. Reporting, Rules &amp; Stand. Rev.</td>
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<td>11,051</td>
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<td>611 Identify and Mitigate Channel Erosion</td>
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<td>626 Upper Watershed Blueprint</td>
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<td>63,359</td>
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<td>414,000</td>
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<td>626 Develop an Upper WS Storage Projects Plan</td>
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<td><strong>WS TOTAL</strong></td>
<td>155,641</td>
<td>63,359</td>
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### Budgeted Expenditures

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<th>Monthly Paid Expenses</th>
<th>YTD Paid Expenses</th>
<th>Percent Spent</th>
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<td>772,500</td>
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<td><strong>PLO C expenses</strong></td>
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<td>-</td>
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<td><strong>Total Grant Funds/FEes Anticipated</strong></td>
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## Prior Lake Spring Lake Watershed District
### Cash Flow projections

#### BEST CASE

**Expected Cash Flow**

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<tr>
<th></th>
<th>May Actual</th>
<th>June Actual</th>
<th>Jul Actual</th>
<th>Aug Actual</th>
<th>Sep Actual</th>
<th>Oct Actual</th>
<th>Nov Actual</th>
<th>Dec Actual</th>
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<tbody>
<tr>
<td>Cash start</td>
<td>$445,661</td>
<td>$136,998</td>
<td>$590,600</td>
<td>$468,681</td>
<td>$542,027</td>
<td>$367,619</td>
<td>$273,619</td>
<td>$163,619</td>
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<tr>
<td>Expenses</td>
<td>$308,663</td>
<td>$710,675</td>
<td>$384,585</td>
<td>$219,785</td>
<td>$174,407</td>
<td>$210,000</td>
<td>$210,000</td>
<td>$417,000</td>
</tr>
<tr>
<td>Revenues</td>
<td>$-</td>
<td>$1,164,277</td>
<td>$11,222</td>
<td>$293,131</td>
<td>$-</td>
<td>$16,000</td>
<td>$-</td>
<td>$1,317,979</td>
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<tr>
<td>Cash from Investments</td>
<td>$-</td>
<td>$-</td>
<td>$251,444</td>
<td>$-</td>
<td>$-</td>
<td>$100,000</td>
<td>$100,000</td>
<td>$-</td>
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<td>Cash Checking end</td>
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<td>$367,619</td>
<td>$273,619</td>
<td>$163,619</td>
<td>$1,064,598</td>
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### Expense Detail

#### Typical Monthly Budget

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<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alum &amp; Sutton Lake</td>
<td>$105,663</td>
<td>$154,804</td>
<td>$112,833</td>
<td>$181,245</td>
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<td>Alum Upper Prior</td>
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<td>Sutton Lake</td>
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<td>$3,602</td>
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<tr>
<td><strong>Total Expenses</strong></td>
<td>$308,663</td>
<td>$710,675</td>
<td>$384,585</td>
<td>$219,785</td>
<td>$174,407</td>
<td>$210,000</td>
<td>$210,000</td>
<td>$417,000</td>
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### Revenue Detail

<table>
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<th>June</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
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<td>Misc/Other</td>
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<tr>
<td><strong>Total Revenue</strong></td>
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<td>$1,164,277</td>
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<td>$293,131</td>
<td>$-</td>
<td>$16,000</td>
<td>$-</td>
<td>$1,317,979</td>
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### Monthly Northland Investments

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<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starting balance</td>
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<td>$377,909</td>
<td>$378,209</td>
<td>$278,509</td>
<td>$178,809</td>
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<td>Additions</td>
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<td>$300</td>
<td>$300</td>
<td>$200</td>
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<tr>
<td>Reductions</td>
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<td>-</td>
<td>-</td>
<td>$-</td>
<td>(100,000)</td>
<td>(100,000)</td>
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<tr>
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<td>$629,767</td>
<td>$378,188</td>
<td>$377,909</td>
<td>$378,209</td>
<td>$278,509</td>
<td>$178,809</td>
<td>$179,099</td>
</tr>
</tbody>
</table>

### Notes:

- Levy revenue assumptions:
  - June actual collection: 75%
  - December: 75%
- FEMA Reimbursement assumption:
  - December: 2020
- 2020 Levy amount: $1,794,632
### Worst Case Cash Flow

**2020**

<table>
<thead>
<tr>
<th>Month</th>
<th>May Actual</th>
<th>June Actual</th>
<th>Jul Actual</th>
<th>Aug Actual</th>
<th>Sep Actual</th>
<th>Oct Actual</th>
<th>Nov Actual</th>
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<tr>
<td>Cash start</td>
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<td>$163,619</td>
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<tr>
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<td>$-</td>
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<td>$293,131</td>
<td>$-</td>
<td>$16,000</td>
<td>$-</td>
<td>$672,987</td>
</tr>
<tr>
<td>Cash from Investments</td>
<td>$-</td>
<td>$-</td>
<td>$251,444</td>
<td>$-</td>
<td>$-</td>
<td>$100,000</td>
<td>$100,000</td>
<td>$-</td>
</tr>
<tr>
<td>Cash Checking end</td>
<td>$136,998</td>
<td>$590,600</td>
<td>$468,681</td>
<td>$542,027</td>
<td>$367,619</td>
<td>$273,619</td>
<td>$163,619</td>
<td>$419,606</td>
</tr>
</tbody>
</table>

#### Expense Detail

<table>
<thead>
<tr>
<th>Expense Description</th>
<th>May Actual</th>
<th>June Actual</th>
<th>Jul Actual</th>
<th>Aug Actual</th>
<th>Sep Actual</th>
<th>Oct Actual</th>
<th>Nov Actual</th>
<th>Dec Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Typical Monthly Budget (not including large capital projects - Alum &amp; Sutton Lake)</td>
<td>$105,663</td>
<td>$154,804</td>
<td>$112,833</td>
<td>$181,245</td>
<td>$167,911</td>
<td>$170,000</td>
<td>$170,000</td>
<td>$170,000</td>
</tr>
<tr>
<td>PLOC expenses</td>
<td>$3,000</td>
<td>$10,005</td>
<td>$8,819</td>
<td>$20,786</td>
<td>$6,496</td>
<td>$40,000</td>
<td>$40,000</td>
<td>$40,000</td>
</tr>
<tr>
<td>Alum Spring</td>
<td>$200,000</td>
<td>$262,319</td>
<td>$14,152</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$207,000</td>
</tr>
<tr>
<td>Alum Upper Prior</td>
<td>$542,375</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
</tr>
<tr>
<td>Sutton Lake</td>
<td>$3,491</td>
<td>$614</td>
<td>$3,602</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$207,000</td>
</tr>
<tr>
<td>Total Expenses</td>
<td>$308,663</td>
<td>$710,675</td>
<td>$384,585</td>
<td>$219,785</td>
<td>$174,407</td>
<td>$210,000</td>
<td>$210,000</td>
<td>$417,000</td>
</tr>
</tbody>
</table>

#### Revenue Detail

<table>
<thead>
<tr>
<th>Revenue Description</th>
<th>May Actual</th>
<th>June Actual</th>
<th>Jul Actual</th>
<th>Aug Actual</th>
<th>Sep Actual</th>
<th>Oct Actual</th>
<th>Nov Actual</th>
<th>Dec Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Levy</td>
<td>$922,861</td>
<td>$-</td>
<td>$36,313</td>
<td>$167,911</td>
<td>$170,000</td>
<td>$170,000</td>
<td>$170,000</td>
<td>$170,000</td>
</tr>
<tr>
<td>Misc/Other</td>
<td>$12,673</td>
<td>$956</td>
<td>$-</td>
<td>$6,496</td>
<td>$40,000</td>
<td>$40,000</td>
<td>$40,000</td>
<td>$40,000</td>
</tr>
<tr>
<td>BWSR Alum Grant</td>
<td>$224,750</td>
<td>$-</td>
<td>$224,750</td>
<td>$-</td>
<td>$224,750</td>
<td>$-</td>
<td>$224,750</td>
<td>$-</td>
</tr>
<tr>
<td>Sutton Lake Grant</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
</tr>
<tr>
<td>Grants - Other</td>
<td>$2,000</td>
<td>$10,266</td>
<td>$32,068</td>
<td>$-</td>
<td>$16,000</td>
<td>$-</td>
<td>$16,000</td>
<td>$-</td>
</tr>
<tr>
<td>FEMA</td>
<td>$1,994</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
<td>$-</td>
</tr>
<tr>
<td>Total Revenue</td>
<td>$-</td>
<td>$1,164,277</td>
<td>$11,222</td>
<td>$293,131</td>
<td>$-</td>
<td>$16,000</td>
<td>$-</td>
<td>$672,987</td>
</tr>
</tbody>
</table>

#### Monthly Northland Investments

<table>
<thead>
<tr>
<th>Description</th>
<th>May Actual</th>
<th>June Actual</th>
<th>Jul Actual</th>
<th>Aug Actual</th>
<th>Sep Actual</th>
<th>Oct Actual</th>
<th>Nov Actual</th>
<th>Dec Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starting balance</td>
<td>$629,670</td>
<td>$630,060</td>
<td>$629,767</td>
<td>$378,188</td>
<td>$377,909</td>
<td>$378,209</td>
<td>$278,509</td>
<td>$178,809</td>
</tr>
<tr>
<td>Additions</td>
<td>$390</td>
<td>$(293)</td>
<td>$(135)</td>
<td>$(279)</td>
<td>$(300)</td>
<td>$(300)</td>
<td>$(300)</td>
<td>$(200)</td>
</tr>
<tr>
<td>Reductions</td>
<td>$-</td>
<td>$-</td>
<td>$(251,444)</td>
<td>$-</td>
<td>$-</td>
<td>$(100,000)</td>
<td>$(100,000)</td>
<td>$-</td>
</tr>
<tr>
<td>Northland end</td>
<td>$630,060</td>
<td>$629,767</td>
<td>$378,188</td>
<td>$377,909</td>
<td>$378,209</td>
<td>$278,509</td>
<td>$178,809</td>
<td>$179,009</td>
</tr>
</tbody>
</table>

#### Notes:
- Levy revenue assumptions: June actual collection, December 75%
- FEMA Reimbursement assumption: December 2020
- 2020 Levy amount: 1,794,632